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Environmental Windows Workshop: Achieving Dredging Decisions that Balance Economic and Environmental Concerns

Introductory Comments

By Session Moderator Thomas Wakeman III, Port Authority of New York and New Jersey

You probably have the agenda, and like everything else, it has changed. What's going to happen is that Doug Clarke is going to set the background for you with the context of the issues. And the windows issue really is driven by certain environmental acts: the Endangered Species Act of 1972; and more recently the Essential Fish Habitat Act of 1997. Those acts are Congress' mandates to resource agencies to protect the resources of the nation, the fishery resources principally. At the same time, Congress has asked the Corps of Engineers and other construction agencies to build infrastructure for the nation under the Water Resources Development Acts.

These two mandates from Congress sometimes collide. And our ability to find rational, workable, economic, effective, optimal solutions is hindered by an inability of knowing what the road map is, the process so to speak.

This workshop is about defining that process. Because Jerry Schubel, who will be your second speaker will talk about what happened in the National Academy Workshop last year. And during that workshop, we defined the environmental windows issue as being both scientific and engineering in nature.

The scientific context will be set by Charles Simenstad, and the engineering context will be laid out by Donald Hayes. At that point, we're going to change from this venue, from the United States venue, to a more global context, and Neville Burt will speak on the UK's perspective on this issue at this point in time. I'm sure it's changing there, too. From that point, we're going to go to case studies. Ellen Johnck is going to speak about one port on the west coast, and how they're currently dealing with it. And I'll speak about one port on the east coast, and how they're dealing with this issue.

Because it's actually tied into many other issues. But that doesn't mean we can't use those inputs, those other models as decision making tools. At that point we would like to open this up. And depending on how the panel is feeling, we will either sit up here, or we'll be out encouraging you to comment.

But by the end of the meeting, Jerry asked me what I'd like to see. And what I'd really like to see is perfect knowledge and a deal. We'll see how close we get.

An Overview of the Issues: Real Problems and Potential Solutions

By Mr. Douglas Clarke, U.S. Army Engineer Research and Development Center

Good morning. My name is Doug Clarke. I'm an employee of the Engineer Research and Development Center here in Vicksburg. I'm a relative newcomer to the dredging arena because I've only been doing it for 20 years. And that's not long compared to a lot of the folks in this room.

But from day one in my career with the Corps, environmental windows has been the theme of my career. I was put immediately on a plane as a fishery person to go and help out with the coordination of environmental window issues that were arising with the districts, and that was in 1983.

So, environmental windows are not by any stretch of the imagination an emerging issue. They have been around for quite some time, and I think I'll point that out several times in my presentation.

Again, my role is to set the stage. The title we set was real problems and potential solutions. It is easy for me to start off. The first part is identifying the problems. The very fact that we've had this kind of a turnout for the meeting today is evidence of a problem.

Environmental windows are on many folks' radar screens now. They have probably become as problematic to the conduct of dredging as the longstanding classical issues of handling contaminated sediments and so forth. These things are emerging now. And it's making maintenance of our navigational infrastructure more and more difficult.

The opposite side of the thing is potential solutions. Hopefully we're heading that way. Certainly we're not there yet. And you'll hear many examples attesting to that fact before the end of the morning session, too.

So, basically what I'd like to do is start with the obvious. I think most of the folks in the room know what we're talking about. Perhaps some of the international folks are kind of scratching their heads, and asking, "what is an environmental window?" Simply stated, an environmental window is that period of time when you can dredge. Seasonal restrictions are the periods of time when you are not supposed to dredge.

And the concept of a window and a restriction is intuitively simple. If you're trying to protect a resource, the basic logic is: don't conduct the dredging that may or may not pose a risk to that resource. If there's no temporal conflict between when you dredge, and the occurrence of that sensitive critter, then you avoid applying risk to that resource.

If it were only that simple to manage around that concept. Well, being a biologist I am a pack rat, and I pride myself on having probably one of the most extensive libraries on

environmental effects of dredging. And my colleagues in the back there who have seen the piles in my office will probably say yah, yah, yah.

Well, I blew the dust off of several things the other day, knowing that Jerry Schubel is going to be the next speaker. And Jerry has been in the dredging arena for a long time. At one point in his career, he was probably at the cutting edge of applying technology to solving dredging problems. And he had put together with some colleagues a document, and I want to point out that it's 1979.

And it's a very short document, but it is a very cogent, coherent document setting out a framework for how dredging decisions should have been made in Chesapeake Bay, and I'll quote. Here I've taken this somewhat out of context, but the point will be made.

"The greatest needs are to remove dredging and dredged material disposal from a crisis mode of management." Have things changed? Probably not. "Where special interests appear to dictate decisions, this requires removing it from that crisis mode of management."

Among other recommendations, they concluded with, "development of simple and effective management guidelines such as dredging windows."

Jerry, how could you have thought that it would be simple? And in that document I'd like to point out another little bit of text. "Open water disposal operations are presently restricted" -- and this isn't the Chesapeake Bay area -- "to dredging a window that extends from October 1st to April 1." This is 1979.

The windows are based currently on best available data. "It should be adjusted on the basis of future research to protect the environment and the biota and acceptable costs." We had it back 1979, our marching orders, what we needed to do.

But I can stand here today saying that it's not done. The research and so forth that was called for back then, many angles to it, many aspects of it are still out there and still need to be done. So again, environmental windows is not by any stretch an emerging issue.

Well, what's going on? Authorities for windows. At least in the United States there are many, many avenues by which windows have come into the fray, as it were, regarding dredging project management, and this is a situation that has evolved over the years.

I think you can go back to 1969 with the passage of NEPA, National Environmental Policy Act. That was the onset when windows became en vogue. And very quickly a majority of all Federal navigation projects were restricted in some way, shape, or fashion.

Additional authorities have been added over the years. Some of these are well known to folks around here. Again, the requirements under NEPA, Fish and Wildlife Coordination Act. A lot of window things are driven by the agency's personnel, the personalities that come to the table when the interagency coordination process occurs.

Whatever hat they're wearing, if they're a Fish and Wildlife service person, they're probably mainly worried about endangered species. Not always, but nationwide that's the trend.

Biological opinions. These are advisories. The Corps doesn't have to stop a dredging project because of an advisory opinion, but they do take them into consideration.

Essential Fish Habitat is the new player on the block. A lot of Corps districts are literally scratching their heads as to how to deal with the Essential Fish Habitat mandate. Please try to define essential fish habitat, or what is not essential fish habitat. It's not a simple thing.

The Clean Water Act. The show stoppers are really down here. The Endangered Species Act which I've mentioned before, and Section 401 Water Quality Certification. This is driven by the state. The state has the ace in the hole. If they say that the Corps cannot comply with protecting the environment within the conduct of their dredging operation, they can withhold the Water Quality Certificate, and dredging will not occur.

And likewise if we cannot meet the requirements of ESA, the Endangered Species Act, that can stop the dredging. Or during the conduct of dredging if a hopper dredge takes one sea turtle, that dredging operation can stop on the spot.

And this sets up what I think is the debate, between what I'll say is dredging project managers on one side and resource agency people on the other. They have two different jobs.

A dredging project manager might take the common sense argument, "Where is the smoking gun regarding dredging?" Really I would say, perhaps somewhat provocatively, that over the years there have been very few cases, with the exception of contaminated sediment issues involved, where there has been documented, demonstrated population level biologically meaningful sustainable levels of effects associated with the conduct of dredging operations. So, the dredging project manager is saying, why are you restraining me when this has impediments to the way I do dredging?

The resource agency person has a different hat entirely. His mandate, his job, is to protect the resource, and that's the guiding light. And the precautionary principle is what they stand on, which is, "If I don't know enough about my resource and how you're doing dredging, I have to go to the option that presents the least amount of risk to that resource."

So they both are doing their best to do their job. The jobs are different. Yet, the theme of the whole thing is striking the balance. Cost effective dredging and stewardship of the environment, same thing. That's the challenge. That's the difficulty.

And the question then cascades down to: upon whom lies the burden of proof. Depending on who you are in the system, again where is the smoking gun about dredging, or how much risk is acceptable to conduct the dredging under your waterway circumstances?

Just quickly, what is the situation right now? This is a graph I put together a little while ago just to show you that there is some regional variation in the frequency of windows. What I have is a plot of the number of contracts on an annual basis for navigation dredging by the regions of the country. The red bars represent those contracts that have fees and restrictions associated with them. And the green are those that are essentially going unrestricted. And what pops out at you right away is that most of the regions of the country are now heavily, heavily restricted. And again these data are somewhat old. I would say that the contrast is even more stark now.

The one outlier or two actually is in the Gulf of Mexico and the lower Mississippi Valley. Those are probably the least restricted waterways in terms of the Corps getting the dredging done without restrictions. That is changing.

Our New Orleans district, Mobile district, and so forth are now dealing with issues they have not had to deal with before; protection of Gulf Sturgeon in their intracoastal waterways and so forth. Given enough time, this will become the same pattern as in the other regions.

I'm a biologist. I hate to get into economics. And we were originally scheduled to have a person with an economics background on the schedule today. But the bottom line is compliance with windows does inflate the cost of dredging. I think we've got a pretty good handle on that. Under restrictions we move 150 million cubic yards of material per year.

And so you only need to move the decimal point over a couple of places to come to the realization that increasing flexibility of dredging by managing windows better would have large economic impacts. For every return of one penny in a cubic yard that you could accrue, we're talking millions of dollars.

And on an annual basis, we're talking considerable amounts of money. I think comments made later by the port people will attest to the fact that it's more complicated than that. It can drive economic factors through the roof, apart from simply the cost per cubic yard calculation.

On the anatomy of a window, just an example of a project file. Again, it depends on who brings their pet concerns to the table. This is an actual dredging project up in Massachusetts, and these did not come to bear all at the same time.

As dredging cycles go through, you have personnel turnover in the agencies. Each one has their own thing to bring to the table. And over the years what happens is you have a cumulative window form.

And here you see that these restricted periods are to protect different things, including commercial/recreational fishing, migratory fishes, and so forth. Recreational bathing and boating, that's probably one of the dominant windows in the Great Lakes region because they don't like dredges out there in front of the marina at the wrong time.

Something had to give in this case because they needed this amount of time to conduct the dredging. In that particular case, they yielded on the window for turtles. Being up in New England, that was the one they decided to yield on.

I know you can't make out the details of this in the back, but this is a compilation of time lines for individual dredging projects, all the navigation projects in the Detroit district for Lake Michigan. And each bar represents an individual dredging project.

The black bar, again this is calendar months across the top, individual project going down here. The black bar is when you can dredge. The open periods in here are the restricted periods. And just looking at that you'd say well, okay, several things jump out at you. One is the start and end date of windows, most of them have the same start and end date.

Also, it looks like just scanning this, this is probably enough time to conduct dredging and comply with the windows. Yet, again this is the Great Lakes, and it illustrates several things. One is that in January and February, most of the lakes in most years are frozen over, and you cannot get a dredge from point A. to point B.

So in the spring when the shoals have formed, the winter shoals have formed, and you have multiple ports that need to be dredged, it coincides with the time that the fish resources are going in and out of the tributaries into the Great Lakes.

So, boom, you have it. You have multiple inlet resources there. Dredging that must be done. Dredging availability is a problem. And this is part of why I say there's an inflated cost of dredging. It's much more complex than that, but I think this is one way of illustrating it.

The other thing is the fixed start and end date. For a window to work, to provide protection of the resource, it necessarily has to be over restrictive because much of the biology is driven by other factors, such as water temperature. And you cannot predict on an annual basis when the key threshold temperature is going to occur.

So, the window has to accommodate a mild winter or a cold winter. And to do that, it just says that in any given year, the window is probably over restrictive on the front end or the back end in many, many cases. How do you get around that? Contracting and mobilizing dredges doesn't happen on a really fast time track. And that's where you have the problem; adapting that to the needs of the resource as well.

I won't spend much time on this. The issues. There's a plethora of issues associated with why windows come to being. A lot of these go back a long, long time, decades and

decades. Respect to suspended sediments on critters, respect to sedimentation on vegetation, spawning habitat, and so forth. The list goes on and on and on.

I won't dwell on it here. The problem over the years in my opinion has been that there hasn't been a mechanism in our interagency coordination process in many regions of the country to integrate the two sources of expertise that you need to bring this to solution. One is the people who really know about the resource and what would be a threat to them, and two is the people who really know about dredging and how the dredging could be conducted to minimize that risk.

And again, I won't spend much time on that because it will be discussed later. But that is an exceedingly difficult thing to accomplish; to bring the right people to bear on the problem on a project by project basis.

Over the years we haven't been able to get the opportunity to conduct the right research to put the technical evidence behind the windows as they now stand.

One frustrating example that I've been dealing with -- perhaps the most frequently cited concern for windows is effects on migratory fishes. Somehow or other there's an interaction between the dredge in a waterway that may impede an aggregate fish, an aggregate being salmon, striped bass, shad and herring species on the east coast and so forth.

This is a time line for what we've been trying to do to apply research. Several years ago I got on a plane and went to Virginia to take part in an interagency coordination unit, in October, 1998. How long ago was that? We set the stage for the studies on the James River. Does dredging impede an aggregate fish's movement or not?

We went at it several times through 1999, setting the stage for the state, the Virginia Marine Resource Commission, to give us permission to do this test of dredging in the river with the fish at the same time. How else are we going to resolve what's actually happening?

They gave us permission to do a test in the river with a dredge, but not during the time when the species of concern was there. We were demonstrating the technologies, the type of data returns that we were getting, so forth.

We did that, had another agency meeting to go over the results of that study, went back to the Marine Resource Commission, and we still did not get the go ahead to do the ultimate study. They allowed us to go during the actual period of the fish run, but without a dredge run. And we had to do the same thing again to demonstrate that we could see, if you would, the fish in the system without the dredge present.

And now we've been going back and forth with another string of meetings. I was in Williamsburg, Virginia last week at the James River Partnership Meeting, another meeting sponsored by the Corps with all the stakeholders in the James River dredging

arena. And we are still not at the point where we can point to a day when we'll have permission to apply the science to learn whether the dredging has or has no effect on those fish.

Part of the problem is that concerns have not been prioritized in many cases around the country. The risk to the resource is not uniformly spread, if you would, among the different life history stages or the species of concern that they may have to contend with in the vicinity of a dredging project.

Many windows are based on simply the assumption to protect fish and shell fish, and you're not given a target for research to address the concern. And right now getting this prioritization done is a challenge in many, many cases.

Are we making progress? We are making progress on some fronts. The Great Lakes Fishery Commission and the Great Lakes Dredging Team are acting as a stakeholder forum, to put forward a regional approach to windows. We've formed a windows advisory team, a WAT. But the idea is to have a smaller group of technical people. And again, you need the key resource people and the key engineering people in the room at the same time to look for alternatives to fix windows, and that's the process we're in now. Stage one, prioritization of concerns. This is not the easiest thing to do.

We have members from all states around the Great Lakes. And it takes a tremendous amount of effort to reach consensus on the highest priority concern.

And then you have to go through and get the dredger, the district folks, to say this is the most problematic window for us. If we can get some kind of resolution here, that would open up a world of flexibility for us. That is a hard thing to do.

Development of negotiation tools. At least within the Corps we are dealing with building tools that we feel have not been available to the folks making these decisions before.

Modeling tools. In most window situations you do go in with a lot of assumptions given. Nobody knows enough about the resource given the tremendous number of critters in each system. I will never know all we need to know to make a one hundred percent risk-free decision. It's a given. This lends itself to modeling tools, if we develop them and calibrate them and validate them and do all of that.

Some of the things we are doing, developing tools that sort of jump the gap from just straightforward sediment transport to things that agency people can make use of through the visualization tools.

SSFATE is a model we're dealing with. It's on a GIS platform. So, it essentially displays dredging scenarios. You can customize it to put a dredge in the river system.

This is one for the Providence River and display plumes that were generated through tidal cycles by different types of dredge. You could overlap that on oyster reef boundaries, on sea grass beds and so forth and use it as a screening tool.

Do we need to target monitoring? Is there any conflict between the dynamics of the plume and the situation with the resource?

SSDOSE is an attempt to take plumes and generate just what is the exposure, if you would, of different types of critters to that dredging event.

So, in this particular type of model, we can simulate running different fishes up in the water column or down in the bottom through these plumes associated with the dredging event and come up with sensitivity analyses. How many of these would be exposed to different types of suspended sediment concentration exposure?

A Fish fate model. This is one of entrainment, of dredges acting as vacuum cleaners going around sucking up critters. A hard thing to monitor, a hard thing to quantify.

This particular model is one of the first tools that does this in a manner that takes its dredging mortality due to the operation of the dredge plant acting on different life history stages whether it's an adult turtle or a larvae oyster and places that into contact with other sources of mortality acting on the population. Commercial recreational fishing, and natural mortality. And places dredging into perspective with these other things acting on the population. Hopefully that will give us some insights into what's real and what's not.

And new technology as far as getting out there and learning about dredging and how that is represented through the basin to the system that critters have to deal with.

Again quickly, hydroacoustics. This was an example. Basically it's a very expensive fish finder. These little red blobs are fish. We're sampling, looking down in the water column moving in that direction, and there's a dredge right here. This was done in the Great Lakes.

And what you see here is a little zone of avoidance of fish of the dredge. It was about 30 meters. And this was one little insight that we were able to give the folks in Michigan, "Okay, could fish move around the dredge by going outside of that 30 meter corridor or not?" And we're hoping that when this is added to the picture it will add flexibility to the window situation in the Great Lakes.

Suspended sediment plumes. This is a barge overflow operation in the Cape Fear River. You can see the visual plume here. Tried to get a 3-D way of looking at the plume and the interaction with fishes. We're looking at tools, acoustic tools to characterize those plumes.

This is a profile down through the water column where you can see the signature of the plume. Can the fish get around it or not? And we have the tools to look at where the fish

are in the system at the same time. I think we're getting there, if we only had the opportunity to get in the river with the fish and the dredge at the same time.

Environmental Windows and the Endangered Species Act: Protecting Salmonids in the Pacific Northwest

By Charles Simenstad

Good morning. I don't think Doug asked me down or Tom asked me down to experience some filtered sunlight from the northwest. I think my role here is perhaps to present the worst case situation you could run into in terms of dredging, and that is dealing with anadromous salmonids that are threatened or endangered under the Endangered Species Act, in a region that has perpetual need, particularly in ports for dredging, the Pacific Northwest.

And just a few introductory comments. The picture up there is a turn of the century picture of dredging in the Elliot Bay where Seattle is located.

And I want to reinforce, not only is this a societal process as Jerry mentioned, but there's a legacy that we and you all in particular are facing that comes home to roost with the Endangered Species Act, because we're looking at trying to recover resources. And people quite often look backwards in time at all the sources of stressors that were responsible in one way or another for the decline and demise of those resources.

And so they're not necessarily looking at the state of the science, the state of the technology, the state of engineering, and how we move forward and recover those resources. So there is a definite need for education and information above and beyond science and engineering.

And the other is, I'm going to ask you to challenge yourselves a little bit because I'm going to ask you to think for the next few minutes about representing that resource; being the scientist, in particular the agency scientist at that table somewhere in step four or something like that. And just sit back for a few minutes and think about if you were the representative of this resource, how would you treat this process, and what would be your responsibility? So this is not only the other person's shoes, but the other person's hat. But I also want to make the strong point that this is from the perspective of a scientist.

The School of Aquatic and Fishery Sciences actually started as the College of Fisheries back at the turn of the century, the same time this activity was going on. And the faculty member at the University of Washington when it started -- well, Trevor Kincaid actually started the Department of Zoology and the medical school; a few other things.

But when he was serving as Dean of the College of Fisheries, he attended a conference back in the days when salmon were heavily exploited. And this was sort of a comprehensive evaluation, a conference about the status of salmon. And there were the

fishing companies and the canners and the wholesalers and the retailers. And everybody went around the room and introduced themselves. And it finally came down to Trevor Kincaid, and he was looking out in this audience of folks that viewed the salmon as a product. And he said, "well, I'm Trevor Kincaid, Dean of the College of Fisheries. I guess I represent the fish."

And that's the important thing for any scientist at that table. They represent information. They don't necessarily and shouldn't be representing their agencies and their agency politics, shouldn't represent necessarily public opinion. They should represent the resource.

Now again I'm talking about sort of the worst case situation. It's worst case because in the Pacific Northwest more than probably any place in the world, except maybe some other regions in the Pacific realm, salmonids -- and I'm technically speaking here of salmon and anadromous trout and char, an extremely diverse family in terms of their passage through the area that you dredge. Kind of a freshwater estuarine and nearshore marine environment are the habitats for those fish and quite often extended habitat.

And they're also at the time in their life history when they are very vulnerable juveniles. They're physiologically sensitive. They're very susceptible to predation, and they're often confined to very highly ecological niches. And because of that, they're behaviorally constrained. There are certain habitats and conditions that they don't have a lot of latitude and flexibility to avoid, either behaviorally or physically. So, their decision process isn't very variable. And we also know that there are some very well documented sublethal responses to estuarine contaminants.

The second time they come around as adults is much less an issue. They're much more focused in time and space on the obvious, on reproduction. There is some issue about delay of migrating salmon. But again their motivation is much stronger behaviorally.

I just wanted to sort of give you an impression. And again I'm going to be talking the rest of the time pretty much about this juvenile phase.

A tidal floodplain with the watershed up here to the right and the ocean out here. And I just want to make the point that this migration through the tidal floodplain and the estuarine zone to the ocean is a very punctuated migration. A lot of salmon move down even during the winter period right after they've emerged from gravel and occupy this tidal freshwater floodplain. And some of them actually even turn around and go back upstream for extended periods, over a year or two.

Those that are actually in a migratory mode will eventually move down into the brackish zone, the lower salinity zone. And those species that particularly need to adapt for some time to salt water will spend anything from weeks to months in this brackish oligohaline zone if the habitat is available to them.

And then eventually those will move down into the euryhaline zones, some of these zones, the area where you probably most often encounter dredging. This is quite often where the ports lie and the channels lie, and then out into the euryhaline and the oceanic areas.

Also in places like the inland sea of the Puget Sound where you'll get juvenile salmon moving back who are migrating, which will eventually come in to these areas and move back out again on their transit out to the North Pacific Ocean.

So, it's really a landscape. Some people call it an ecoscape that salmon will spend a whole variety of periods in. And in some cases there are some definite ecological bottlenecks such as this position of the brackish of the haline zone where they must adapt to increasing salt water.

The other is that there's a whole sequence of life history trajectories of these fish. So you have species like pink salmon, which move very rapidly down into estuaries with no freshwater rearing. Their estuarine rearing will be on the order of a few weeks, and they'll move rapidly out to the ocean. And they have very fixed periods, two years in the ocean.

Chum salmon are sort of the same thing in terms of their trajectory, but they have more extended estuarine rearing. They're probably the second most estuarine-dependent salmon in our region.

Coho salmon in most cases are rearing in sort of this trajectory in freshwater. And they move out with very little estuarine rearing.

Sockeye is pretty much the same thing. And here we have Chinook. And if you add up all these trajectories and all the periods they spend in the ocean, there's about 36 odd life history trajectories. And each of those potentially is characteristic of different populations.

And the ones that are of most concern to our discussion today are those that actually spend very little time in freshwater and will come down and spend sometimes three months in estuaries before moving out to the ocean. And again this is quite variable, but the variability is the key.

Now, this might be sort of what you would consider to be again the worst case situation in trying to protect the resource that's passing through an estuary. I'm using this as an example, and again it's an extreme example. This is the historic structure of juvenile salmon passing through the Columbia River estuary. This isn't the way it is now, and I won't go into the reasons for that.

But the point I do want to make is this diversity is what many of us feel has been lost in Pacific salmon populations. And it's this diversity to a large degree that has

accounted for and potentially now is not supporting the resilience in the population to environmental variability in the ocean.

But what I want to point out here is the most susceptible life history types, which are these fish that are very small. These are fry, several kinds that are less than 50 millimeters. These fish are only this big. Fingerlings to a lesser extent.

And these Yearlings, these large fish that spend a large amount of time in freshwater. Notice that these Yearlings are really sort of in this February to June period.

Whereas these what we call ocean-type fish, that spend much time in freshwater are spread throughout the January to November period. This is just one year. So, if you took one population, these are all the life history types, and the timing through the estuary, so where is your window?

Now this gets complicated in the Pacific Northwest with listing the number of species. The Columbia River system has 13 stocks that are listed as threatened and endangered. And two years ago two stocks in the Puget Sound, the Summer Chum, and then the Puget Sound Chinook were both listed.

And all of a sudden that ups the ante. That ups the risk factor. The allowable take now becomes probably not as bad as turtles but, you know, becomes tens to hundreds.

And there's an interesting aspect in that you can treat inner estuaries just like that picture I just showed, as having some unique stock characteristics that you can work around.

You get into places like the Puget Sound where you have complexes in estuaries. All of a sudden you have all these populations mixing in a system. So, your estuary all of a sudden isn't going to have just fish from one stock. It's going to have fish for the whole series of stocks potentially down the coast.

Salmon from hatcheries dominate the runs and the lobbies, but the trouble is that the hatchery fish are not analogous to the wild stocks that are mandated to be recovered. And while hatchery fish may have some characteristics that make them less vulnerable to dredging impacts, wild stocks probably represent those that are more vulnerable.

And the other thing is that this isn't just a situation now of the laws and the regulations that Doug put up in that sort of circle diagram with all the arrows pointed to it. We now have the equivalent to international treaties. That's the treaties with the Indian tribes that also play a major role in the decision process.

They absolutely have to be at that table. And not only have to be at that table, they represent not only an exploiter, but they represent a cultural and a very strong social attachment to salmon. Maybe even a stronger impetus than the economic.

I don't probably need to go much into this. You know, there's a variety. You could probably use exactly the same diagram for shad or a number of anadromous species. You have issues of acute mortality, with entrainment, dissolved oxygen, sublethal contaminants, the indirect, sort of sublethal delayed mortality effects which again is one of these things that, with resources that are not at risk quite often doesn't enter the equation. Those responsible for protecting the ESA, threatened endangered species, have to look at delayed mortality.

The other thing, which is also seldom considered, is this ecosystem change, the actual effects of the dredging itself in terms of the ultimate configuration of the estuary, and how that might influence long-term fitness of the fish.

The important thing in terms of the salmon vulnerability to dredging plumes is that they're surface oriented, and the fry are restricted to shallow water. So, where any plume impacts or intersects with the shoreline or shoals in shallow water habitats and the surface, they're most vulnerable.

And particularly those that are listed in the Puget Sound, they're more vulnerable to brackish regions where they're undergoing smoltification. They do avoid turbidity. And I think there's a lot of potential information that could be developed that would give us a better understanding of that avoidance response. And they've evolved in terms of ecosystems.

So, it's not like turbidity itself is necessarily an impact. But it really does depend upon the extent of impingement of that migratory corridor and those rearing habitats. But it's very dependent upon the population structure. And so it's sensitive to this sort of landscape context.

I just wanted to point out that again, we talked about the tool box. There's a whole suite of tools and specifications that are used in our region in the state of Washington by the Washington Department of Fish and Wildlife. Timing limitations for environmental windows are just one of those aspects.

But this is the technical basis. This is what the resource agency brings to the table in terms of returning the environmental window. It's based on protecting 90 to 100 percent of the run time, but in broad areas. This is based on data from trapping juveniles as they're moving out into the estuary and actually sampling them in the estuary and the coastal neutral zones.

There are some very broad geographic groupings representing sort of roughly equivalent tiny windows. That could be a lot more definitive, and the data is actually there. It's sort of the nexus between not quite being confident about the applicability of data from one system to another as well as reluctance to get too specific in an administrative code that takes months, if not years to modify.

And as Jerry pointed out, it still quite often comes down to the best professional judgment of the local habitat biologists.

This is sort of what those geographic groupings look like. In other words, 1 through 9 here, I've highlighted 4 because I'll use that as a case study. But this whole group of the Puget Sound along the eastern margin is considered to have the same general stock characteristics.

This group of route canal and the eastern shoreline, Puyallup has another, and then the other, of course, Grays Harbor and Willapa Bay have different ones. So, those sort of form the general stock characteristics.

But, in fact, stocks from the Skagit River and Snoqualmie River, and various watersheds have some very different stock characteristics. This is just a grouping for utility sake. And that in some respects is compromising the flexibility of windows. So right now although this is under modification, that's not the window, but the precluded period of dredging for salmon in Washington State. This is before ESA. And you'll note that there are fairly broad exclusion periods, March 15th through June 14th, March 1 to June 14th in each region, but this is before ESA.

The state is now looking at several options which are much more specific, but as you'll notice are much more constrained.

We're now talking in most cases February 15th, except down here, several places March 1 going at least through July 31st. In some cases, down to September 1. So, all of a sudden that window has shrunk dramatically.

So, what are the alternatives? How do you work and exploit potential flexibility in that process? There are two or three, and I'm going to talk basically about the system specific one. And that is to use location specific, stock specific, estuary specific data to try to adapt the window to the variability in those local populations.

There are also issues of actually monitoring such intensity and scope of the stressors as well as actually real-time monitoring, determining how the fish are responding and adjusting dredging activity at that time.

There's an interesting example that I'm going to use to wrap up, which is the approach that has happened very recently in looking at dredging that has to occur in Commencement Bay. This is where the Puyallup River comes in the Puget Sound. This is the city of Tacoma. This is what it looked like historically. Those of you who have been to Tacoma now know that it's a string of waterways that constitute a Port of Tacoma that occupy the historic type flat in marsh.

These to a large degree are the concentrated areas, super fund sites. And we're now at the position of clean-up Commencement Bay. And so we have now the intersection of ESA and super fund.

That brings another whole suite of people to the table, but it also brings a real desire on the part of EPA and Migratory Fishery Service, and the other parties to try to balance what they perceive to be the impacts of dredging and the ability to clean the system up and contribute to the recovery of specific salmon in this system as well as any other salmon that might use the estuary by removing the contaminated sediments as rapidly and efficiently as possible. So there's the impetus to make this work and be flexible at how to make it work.

And so what's happened is that this decision to try to allow as much dredging as possible to get contaminated sediments out there and do other remediation means that they are now looking at conditioning dredging from this original February 15th to August 15th to now backing off and incorporating some flexibility on the later stage of this prohibition period.

Because the fish that ultimately come out later are potentially more and more of the larger fish that are less and less vulnerable. So the idea is that they have some flexibility they could give up in terms of interpreting the fish's vulnerability to dredging at the later end of the period. And based on this, they now have become more flexible in terms of permitting dredging not only back to July 31st, but also to July 16th.

So, when there's a real impetus to deter fish and remove other stressors such as contaminated sediment for long-term recovery, the flexibility becomes much more evident. And so what you really need to do is examine how we can look at each dredging case with this level of flexibility and incorporate that information that Jerry talked about.

So, I'll just finish up with some research graphs. You know, as Jerry said, there's the automatic response, we always need more information. But you can see that the power of this sort of flexible approach on an estuary stock, watershed specific aspect suggest that that level of information really offers some potential to take it case by case or estuary by estuary and allowing and modifying windows to both protect the species, but also to accommodate the variability that exist in those population structures.

There's also a need, as Doug pointed out, to really understand better the behavioral responses to not only dredging, but also noise and other near field influences, and to better understand how fish respond to that across that ecoscape or the estuary.

And the individual population significance of nonlethal responses is something that again is shown on the table with very little data and very little information. That's another aspect that really needs to be pursued, the extent of mixing a population in receiving waters. With the ESA we now have the ability to know much more about the sources of fish that are mixing in zones from different estuaries, different watersheds. So, that information is gradually accumulated.

And really the issue of contaminant exposure and delay and sublethal injury is one that's always going to be on the table until we gather more information about that. Thank you.

A Stakeholder's Viewpoint on the Environmental Windows Coordination Process

By Ms. Ellen Johnck, Bay Planning Coalition, San Francisco, California

Good morning. I'm going to do a little variation today, no power point. However, this has not been death by power point. These have been excellent presentations. Tom introduced me as Ellen Johnck. Actually my alias is the mud lady, and let me tell you why. I am going to read you a press release: "Alert, Alert, Alert. Call to action. Dredging of the San Francisco Bay and Delta Region is threatened by a severe problem. The problem is environmental windows and resultant seasonal restrictions imposed by the National Marine Fishery and the United States Fish and Wildlife Services.

All maintenance dredging in the bay is affected totaling some 3 million cubic yards of material, which is dredged annually. The dredging projects affected are the major transportation facilities in the bay: The San Francisco Bay Bridge, San Rafael Bridge, the Ports of Oakland, San Francisco, Richmond, Redwood City, and Benecia; our oil refinery terminals, ship repair facilities, the U.S. Army Reserve service facilities, and the primary shipping channels throughout the bay. Due to the multiple species and the overlapping seasonal restrictions, all of our dredging is now cumulatively squeezed into a three-month time period. That is our work window.

If we can't get the work finished in the window, we must apply to dredge in a restricted period, which means going through a consultation process. This process is cumbersome, time consuming and unpredictable, and usually the answer is no even after months of consultation.

The entire bay industry complex and all of the suppliers and workers dependent on it is headed for unprecedented negative economic repercussions if the present windows system and procedures remain in place.

Dredging crews and expensive equipment sit idle for six to eight months of the year waiting for the window. Frequently projects begun in the window cannot be completed within the window and must be suspended without being finished. There is not enough equipment to do the required work within a window. So many jobs just aren't being done resulting in dangerous shoaling. Actually about a year ago one of our oil tankers ran aground because the dredging project wasn't completed in time.

A serious problem with the consultation process is that NMFS and Fish and Wildlife do not have enough sound science regarding the impacts of dredging and, therefore, are forced to err on the side of conservancy without regard to the economic impacts on the industry.

For all the above stated reasons, the Bay Planning Coalition is calling for a suspension of the present windows by NMFS and the Fish and Wildlife Service. In its place we are convening a multi-agency, all-inclusive stakeholder-based process to develop windows based on sound science and balanced with a thorough evaluation of economic and environmental risks.

In a nutshell, this is the stakeholder's perspective on windows. And this is actually a press release that is about to be issued by the Bay Planning in alliance with other industry organizations in the bay. This is very serious stuff, and we're getting political. As one of my mentors, Charlie Roberts, a long-time member of PIANC and head of the Port of Oakland and our former District Engineer in the San Francisco district, used to say, "Ellen, forget the science and the engineering. It's all political." I'll give you a little more word on that, but we know that we cannot ignore the engineering and the science.

Due to the press of time at this juncture, I am going to try and shorten by remarks and give you a brief background on the history of our dredging process. Actually the Coalition and the agencies have convened a collaborative process and have been meeting for at least ten years now. This is our LTMS program. However, it is breaking down which is why we need a new process or a reinvention of one, or maybe we haven't constructed the process right in the first place. Maybe we forgot to do what Neville pointed out, and that is we forgot to consider that the people who are opposed to dredging are just unalterably opposed to dredging. And all of our window dressing that we put on with windows mitigation really is just a palliative. So, we probably have to keep this in the back of our minds all the way through.

Many of you probably know the history of bay dredging. San Francisco Bay has been dredged annually for over one hundred years. Thank you to the United States Army Corps of Engineers. We have a terrific relationship with the Army Corps, and we stand behind them. And we hope they stand behind us every step of the way.

Two-thirds of the bay is less than 18 feet deep. In past years the volume of dredging needed to maintain the shipping channels to a safe depth has averaged between 6 and 8 million cubic yards. But recently our volume has been less,-- last year it was about 3 million cubic yards.

Historically dredged material from the navigation channels in the San Francisco Bay was disposed of throughout the bay. We bring it downstream, and it disperses. Beginning in the early '70s as environmental concerns about dredging arose, disposal began to be constricted to just a few sites. There were actually about 11 in the 70s, still chosen for their dispersement characteristics with most of the material taken to a site off of Alcatraz Island.

Although sediments were expected to dispose and disperse at Alcatraz, a large amount of dredge material started to accumulate in what was once a hundred foot deep

hole. Actually that hole started to fill up about the mid '80s. We began to work with the Corps and navigation interests trying to find ways to improve the capacity of the site. Material continued to mound.

At the same time, the fishing interests were very upset. We were slurring with methods that we thought would create more disperement. And, of course, the fishermen complained that we were creating more turbidity and they couldn't find the fish. So, they created a flotilla of boats, and encircled the disposal site and stopped all permits.

We said we've got to do something. Let's put all the agencies in one room and come up with a plan. It became apparent that not only did we need to find a way to address the issues at Alcatraz, but also we had to find alternative disposal options. At that time we also had been working for on designating a deepwater ocean site. And there was a new idea we considered. Why don't we use materials and take it back to the uplands where it was once and recreate wetlands and marshlands. We would try to show that the ports can be environmentalists, too.

So, in 1990 the Bay Planning Coalition went to the Army Corps. We went to the division engineer at that time, John Sobke, and said, "John, we need you to stay here in the bay area for one month. We want you to pull the agencies in one room, Fish and Wildlife, NMFS, the environmental groups, the stakeholders in the process, and come up with a dredging plan".

John said, "Okay, I'll do it." And he did, and that's the leadership that it took. The process was called the Long-Term Management Strategy. The Corps spent \$16 million dollars on the entire project. Here we are ten years later, and we have just completed the plan. The plan bought us time to continue to use Alcatraz under some site management techniques. In addition we conducted several studies on turbidity in the bay and how it was affecting the fish and the bioavailability of contaminants. And also the Navy helped us by providing \$7 million to identify a deepwater ocean site.

Another success was an agreement from the environmental groups that we would continue with dredging; that dredging was important; and that we should dredge in an economically feasible and environmentally sound way. We also agreed to maximize the beneficial use of dredge material and to develop a coordinated permit process. Our new Dredged Material Management Office (DMMO) has an office in the Corps.

All the agencies meet together twice a month to review all projects. The BPC received Vice President Gore's hammer award for the creation of the DMMO. We hammered down a plan. So, we have one dredging application which must receive the sign-off from about eight or nine agencies somewhat all at once. It's better than it was. But, of course, it's not perfect yet.

So, the LTMS process took ten years, and cost \$16 million dollars. The final product was a joint state/federal LTMS which adopted the 40/40/20 disposal strategy. 40 percent of the 3 million cubic yards of material dredged in the bay must be taken to a

deepwater ocean site 55 miles from the Golden Gate Bridge. 40 percent should be taken upland for wetland restoration and reuse. We didn't have any upland sites at that point, but that was the target goal. And 20 percent may be disposed of in the bay. The goal over a twelve-year period is that the capacity of Alcatraz would be scaled down to about 1 million cubic yards a year.

Last year, we put barely 2 million cubic yards of material in the site and the balance of the material went to the ocean. Today we have a new generation of upland sites being planned. So, we have made a lot of progress on the 40/40/20 disposal plan already. The other important project, which is called new work dredging, is the deepening of the Port of Oakland. BPC has been successful in facilitating the deepening of the harbor from -38 feet when we were first organized in 1983 to a -42 feet which was completed a couple of years ago.

Congress authorized the -50 foot project two years ago. And most of that material, 12 million cubic yards, is going either to the ocean or to a wetlands restoration site. So, we have made huge leaps in progress to consider both environmental and economic objectives hand in hand and to show that we can reuse dredged material rather than just dumping it in Alcatraz and hope that it disperses.

Something happened. Just as the LTMS EIR was published, we discovered something new in the Record of Decision. The U.S. Fish and Wildlife and the National Marine Fishery Service hereby had written an entirely new section entitled the Programmatic Consultation. The wildlife agencies were announcing that they have analyzed and produced their biological opinions on the multiple species of fish and wildlife that are endangered in the San Francisco Bay region and delta.

Further, they have determined that they could issue a jeopardy opinion on this LTMS process unless dredging is conducted according to new mandates-- seasonal time periods.

Well, BPC members had only 30 days to comment on the new 100-page addition. We said, wait a minute, what happened here? We just completed an excellent cooperative process, and all of a sudden a new regulation appears: windows. We had been used to a 3-month herring restrictive period, Dec. 1 -March 1 for many years, but we were staggered by the listing of the multiple species and resultant overlapping restrictions.

So, that is the history of dredging, LTMS, and windows. What we are worried about with the programmatic consultation is the legal issue which we really haven't honed in on. There is a strong probability that these windows are an underground regulation. The Endangered Species Act was not set up to stop progress, and the agencies will tell you that. They give you opportunities. If an action is supposed to cause a jeopardy, then you come up with reasonable and prudent alternatives, and/or mitigation, but there's no alternative to not dredging. You have to dredge.

So, we think this is kind of an insidious development, and some of our members want to file a lawsuit. However, discretion is the better part of valor, and so we have decided that is more prudent to work with them. We're not ready to file lawsuits yet, but some of the industries in the bay are very concerned that NMFS has really held the Corps hostage.

The Corps has to make permanent decisions, and they are the action agency, and they are actually held up right now by these windows.

So, what have we done about this? We are asking the agencies to commit to a process just like they did for the LTMS. This is really a test of the LTMS in operation. So far, they are willing to work with us because it appears they understand that if all your dredging is being squeezed into three months, it's obvious that this can't be.

However, we have no leadership. We don't have the right people. And when I went to Jerry Schubel's workshop last year, I said okay, this is something that really has to be instituted for the bay. And now I'm asking PIANC and the National Academy of Sciences to help us develop a couple of regional demonstration projects. I think New York, and San Francisco Bay could be excellent candidates to demonstrate how to move past the scientific muddle.

The other point that I want to make is I was very much taken with Charles Simenstad's point about looking at this issue from a landscape context. In 1990 we were able to overturn some dredging stoppage by pointing out to the National Marine Fishery Service that the real culprit for what they thought was an adverse impact from dredging on the winter run with the salmon was actually a drought in the delta.

And the drought in the delta was having more of an effect than dredging could ever have had. We did our own scientific analysis, and we also called in our state senator. He convened a multi-agency group and said, "look, here it is. You've got to keep dredging going. Is this really what's happening to the salmon?" And that worked.

I want to conclude and tell you that it's really an honor to be here today at PIANC. I've been a member for several years and have worked with the many PIANC ports and industry members. PIANC has always had an exceptional technical expertise. To me it's the engineers and the scientists that can really help this process by pulling together some political commitment as well.

With PIANC's help, we can elevate our nations' ports and related maritime industry to a national economic priority. Also we can hold up our record as sound environmental managers leading the way for responsible environmental regulations. Thank you.

A Process for Setting, Managing, and Monitoring Environmental Windows for Dredging Projects

by Jerry Schubel, Washington College, Chestertown, MD

Thank you. First I have to make a few introductory comments. It is true that I've been involved in this business much longer than Doug. And so I think we have to forgive him for his youth and inexperience in some of the things that he said.

I think we have the answer, though, to Doug's problem. What's missing I think is the framework or a context within which to apply tools and knowledge, but it has to be in the context of 'you're going to make a decision.' We are going to make a decision.

I was sitting there thinking of -- there's a wonderful play called "The Virtuoso". Thomas Shadwell, a British playwright wrote it. Neville probably remembers. It was either the early 18th or the late 17th century.

And in this play "The Virtuoso", the main actor is Sir Nicholas Jimcrack. And when the curtain goes up, Sir Nicholas Jimcrack, a scientist, aquatic scientist, is lying on his laboratory table making frog-like swimming motions. And his assistant comes into the room and says, "sir, do you intend to try it in the water?" And his response is, "never. I content myself with the theoretical aspects of swimming and care not for the practical." And then he added, "I seldom bring anything to a useful conclusion."

Now, a lot of the research in dredging has not been brought to a useful conclusion, and we've got to have a process that somehow allows us to do that. And it's got to bring together not only scientists and engineers the way Doug said, it has to bring the other stakeholders to the same table because these are social processes and they're not scientific and technical processes. And so we've tried to develop that.

I think Doug has given us a good introduction, and so I'm going to get through this very quickly. I think it is important to underscore, though, that windows are only one management tool in a whole portfolio, and they should be used in that context with all the other tools that we have available to us to minimize impacts.

They are seductively simple because what they're saying is that there are times of the year when dredging and disposal operations will have a lesser impact on the environment or esthetics or biological resources than other times of the year. So, it's a seductively simple concept that's gotten out of hand. And 80 percent of all Federal projects now have windows of some kind associated with them.

The need for consistency, predictability, and reliability, was part of the charge that we had for the academy study. And the comment was made that windows need some CPR; consistency, predictability, and reliability. They are set at the district level, and

there are wide variations in the studying of processes. We looked at a number of districts in conducting this study.

There are variations in the number of projects for which there are windows. There are variations in the use of science in setting windows. In some cases science is not used at all. And in some cases there is a real attempt to take advantage of the science that we have.

And there's great inconsistency in the monitoring to determine whether the window made any sense at all. So the next time you have to dredge this project, you may want to use that window or a different window or no window at all.

Our process was designed for Federally mandated projects and that may be because we went from the Mac to the PC. So, the question is not -- whether or not to dredge. It's when to dredge.

The process that we put together exploits all of the data and information in a particular area, but it does that only if you can bring the right people to the table and keep them there. And it can be incorporated into existing stakeholder processes so that you shouldn't have to create something de novo.

The criteria for dredging processes. People get enamored with processes, and they talk about the beauty and elegance of processes. That's silly. Processes should be judged by the outcomes that they produce, whether those are decisions or products or services. Or in the case of the process we've designed, whether they produce decisions that can be carried out in a timely way. Those are the only ways to judge processes.

Deciding whether or not to dredge. Again, it is not a scientific question, although science can help us. And there are technical dimensions. Richard, the late Richard Feynman, the nobel laureate. And if you haven't read any of his popular books, you ought to. If you get the chance to see the play QED, which is about the last few years of his life, go see it.

He was a remarkable man. Not only a nobel laureate in physics, but one of the most distinguished teachers, professors that we've ever had. And on top of that, he operated at the interface between science and society. And he made the point that when you understand something, it gives you opportunity to do things, but it doesn't come with any set of instructions on what to do. And that is not a scientific process or how to apply that knowledge. And that's what we've got to do with these processes.

Stakeholders. In our process, first of all you bring all the stakeholders to the table. They decide, they frame the issues, they look at the region. They talk about all of the projects that need to be carried out within this particular region, and then they form a high level scientific advisory committee that is charged with telling us what's at risk, which of these are the least vulnerable, what are the thresholds.

They then hand that information to a group of engineers who recommend the best kinds of technology in project management. And then it comes back to the scientists who then are charged with saying all right, this is what the engineers tell us. We know these are the resources we want to protect.

What are the windows that we would recommend in order to both protect the resources, but make sure the project gets carried out? And then they hand that back to the stakeholder group, and they're charged with making a decision.

It's a simple process, but carrying it out is extraordinarily difficult because it involves people with different viewpoints, many of whom are posturing for the groups that they represent, and that's what we somehow have to overcome.

Primary stressors. Since Doug already did these, I'm just going to put them up, and you can take a look at them. I think they're the same list that Doug had.

All right. This is our process, and it's contained in a little book that came out from the academy some time last year. First step. You convene the stakeholders, and you make sure that you have all of the right stakeholders there so that all of the groups who have a stake in a particular port, a particular area are represented.

A friend of mine who's an African-American told me at a meeting, "if you're not at the table, you're on the menu." And he told me, "don't ever forget that, Schubel." And I think that's a good point.

We've got to make sure we have not just the scientists and the engineers and the port people at the table, but we have the group of environmentalists who really do care about the environment. They need to all be there at once, and they agree on the procedures and they agree we're going to stay at the table throughout this process, and we are going to make this work.

Now, that takes some time because you have to build some trust, and it's not something you schedule from 9:00 to 10:00. These processes take time. Most social processes suffer huge inefficiencies in order to be effective.

The frictional losses in social processes are absolutely huge. But if you're not prepared to tolerate inefficiency, you shouldn't be the person who's convening these sessions because you surely will not be effective downstream. So, this is agreed upon.

The next step, you look at all of the project details. Are windows in place? You identify the resources of concern, and you talk about not just a single project. You don't do this for one project. You look at a region, and you look at the whole portfolio of projects that are proposed, and you deal with all of them.

And as I mentioned, you then appoint science and engineering teams. And they've got to be the best scientists so that when people look at the names they say, you

know, yes, that guy really belongs there. They can say I wish they had put somebody on that also. But they should not be able to say scientist X. or engineer Y. have no business being on those teams.

All right. In step 3 this is now the scientific committee that's at work. They're compiling data on specific impacts and general life history literature. They really wrestle with all of the data and information, and they do it in the context of this particular region.

Again, I would underscore that efforts to synthesize and integrate information become valuable only if they are done in response to a particular set of questions or issues. Simply to integrate everything we know about turbidity, for example, would be useless. I think it's got to be done in a specific context. You have to be mining the data and the information to respond to a particular issue.

So, you get as much of this as you can, and this will be used year after year. And, yes, it should be updated as new knowledge becomes available. And you ask yourself are there sufficient data? Is there sufficient information in order for us to scientifically make a recommendation? And I would distinguish between data and information. They are not the same. Peter Drucker I thought had the best characterization. The management guru said, "information is data endowed with relevance and purpose." We have a lot of data. We don't necessarily have the right kind of information or Mediwire said, "it's information that has been architected in such a way that it delivers a message."

So you ask yourself, are there sufficient data? If the answer is yes, then you identify the stressors and the threshold levels for the particular organisms of concern. If the answer is no, you look at other species or other projects in other areas and see whether you can learn something from another region that may be the same species or closely related species.

And you may end up being able to say yes, there's enough data from Delaware Bay so that we can resolve this question on Chesapeake Bay for these same species for what we're doing. If the answer is no, then I think you use your best judgment and the available data. And if you want to say these are the questions that we need specific research on, fine, but you use the existing data and information that you have. And you then do the same thing. You come back, and you identify the stressors and the threshold levels, and you reckon this now in the light blue. These are the engineers. They come back and they say, all right, these are the stressors and the threshold levels. This is the kind of engineering we think you should use. This is the kind of dredge and disposal operation, et cetera, that we recommend to you.

This comes back to the scientists. They look at it. They review the impacts of what the engineers have said, and they then consider window applications and modifications. They've got the best scientific, the best engineering input, and it is not to say whether or not you're going to dredge it. It's to say when do you dredge then you have the least adverse impact on the resources of greatest concern whether those are esthetics or striped bass.

You could recommend the window always be open; that there are no reasons at all to have any kind of temporal restrictions. Or you recommend windows for species by spatially explicit regions and areas. So, you don't have to have a window for the entire New York Harbor. You might have a window for a small tributary where there's a project.

And you prioritize these windows because you saw in Doug's presentation that if you put a window up there for every species, there's not much time left, because they occur at different times of the year. And our mothers used to tell us, "don't worry when one door closes, another one will open." That doesn't seem to be the case with windows.

All right. The scientists then make their recommendations to the stakeholder group. And they're saying there's a community of scientists. This is the best judgment based upon the information from this area, other areas. These species are concerned, et cetera. And not all scientists like to do this.

And so again, you not only have to have the best scientists, but I think you have to have people who are willing to push the data and the information. Don Pritchard is my old mentor. He's dead now, but he was a master at that because on the Chesapeake Bay whether it was the Port Authority of Baltimore or the Secretary of National Resources, he said we've got to make the best decision. And he would work hard with a group to try to do that.

Another colleague I won't mention by name since he's already dead and that wouldn't be nice. I can say bad things about Doug Clarke, he's still alive. But this other guy's answer always was we need more money for more research, and he always got it. But Don used to force him a lot on these. Gene, we're going to make the best decision we can. And, yes, we'll get some more research.

That's what has to happen there. The stakeholders, they review the team recommendations, they consider the socioeconomic implications. And those are an important input in this group of stakeholders.

The same ones who started this process months ago, have been meeting so that even though they may disagree in their viewpoints, they begin to trust each other and like each other and respect each other, and they can disagree without being disagreeable. They then make windows recommendations.

And the dredging is conducted. An appropriate monitoring program is carried out. And at the end of it all, there is a census that determines what did we learn from this season's dredging in this particular region because this is a process that keeps going.

And we want to try to keep that core of stakeholder group intact. And it requires someone to facilitate it who does know how to move meetings along and let different people speak.

The stakeholder group reconvenes. They consider steps 1 to 5. They review the findings, and they recommend improvements for the next cycle. And then you start it all over again.

And these processes have to keep going and going and going. But as they do, they ought to be able to help us make better decisions. I really do believe that if you can get the right people at the table and create the right framework, that you can make rational decisions.

And in part you're diluting your rationality. And in part, you're making people be accountable in front of their peers. And they have to take more rational positions. You're going to talk all about this I hope.

Just briefly I've got some time left here, even though Doug took part of my time. We had two national meetings. One was a sea grant conference and dredged material management that was at MIT in December of 2000. And then we went to the National Dredging Team Conference in Jacksonville in January of 2000. We conducted case studies in ten Corps districts. And it was interesting because the case studies were conducted in parallel. We went to the Corps of Engineers and said, give us your view of how windows worked in this particular district. And then we went to NOAA independently and said, give us your view of how they work. And then we tried to see how these two viewpoints converged. And we had then a conference that was designed and conducted by the committee using input from the surveys of case studies, the two conferences.

And there's a case where when originally the academy was asked will you convene a conference that would discuss all of the things which we know about the impacts of dredging on the environment and discuss windows. And we said no because we did not think that was going to be very useful. You get a hundred people together and you discuss turbidity and entrainment. It doesn't help you very much.

So what we said we would do is we would try to design a process, and we would then present that process going into this conference, and there would be times throughout the conference at which participants could modify it, enhance it, enrich it, change it.

And throughout the conference we would present this to a panel that would include someone from the Corps, someone from NOAA, someone from EPA, and then we had one person representing a port.

So the idea was this is what we're proposing, is it going to work? Will you NOAA participate? Now, we didn't have Fish and Wildlife at the table, and we should have. I think it was a good conference.

I've already told you that. And now before I go to some selected recommendations -- well, let's just do this. Let me put them up. Dredging and disposal

activities are only one of a number of human activities that affect the nations' waterways, and they need to be evaluated in that context.

The stakeholder group needs to be reminded that dredging in the PORT of Baltimore is only one of a series of impacts or influences on that Port, and you need to evaluate it in that context.

They are one of a number of tools, and I've already made that point that they should be applied in the context of all of the other tools that we have available. And in some cases windows probably aren't appropriate at all.

The existing processes vary widely, and there's virtually no consistency across districts. And we recommended that this proposed process be pilot tested in at least two or three districts. I still think that's an important thing to do because otherwise this thing will just be filed away. And then at a meeting 20 years from now, Doug Clarke is going to be standing up here saying Schubel and all and whatever recommended windows. Let's find out if it's any good. And if it's not, let's get rid of it. I think it's worth a try. It darn sure won't make things worse. That's probably the most important recommendation.

We know far more about dredging than we like to acknowledge. And partly having been a scientist for many years, you know, we used to look at these. These were welfare programs for science because you guys in the Corps, you were easy picking to get money out of. And if we didn't have a Tropical Storm Agnes come along that would fund our research, we always knew that the Corps was there. They were good for it. I'm being a little bit facetious.

The most difficult step in the process is step 4, recommending a plan because that's where you have to balance the scientific, the economic, and the societal considerations. And again this is not a scientific process. These are social processes, they're government processes, and we have to take that into account.

And structured decision making tools can be helpful in arriving at decisions, and there are a whole bunch of these. And I think the one you choose depends in part upon the personalities of the stakeholder group and how familiar your facilitator or the chair of the group is with one or more of these.

Windows. Now, that one comes almost just right out of that report that Doug read from what was that 1979? They should be evaluated based upon the scientific information that we have. This just tells you all of the committee members, and I'll leave that up for just a second. And you can see that Tom Wakeman was a member of that committee. And so if there are any deficiencies in the report, I attribute those to Tom.

Some resource agencies say we just don't have the money and the resources, the people to bring to the table. But those same agencies often are the ones that snooker you when you're just ready to get a project underway. They do have time then.

The recommendation which I was I think a minority view on, additional funding should be allocated to make sure they're at the table. If that happens, boy, you better make sure they're at the table. They've got to come to the table. They've got to be good citizens, and they've got to help in the search for these sustainable solutions. And I do think peer pressure is very important in this whole process.

And I think I will end there, and I thank you very much.

MR. WAKEMAN: Jerry has made a very good point. We spent a lot of time and energy trying to figure out where to go with the windows issue. In several different meetings, several different venues, and then followed it up at a national conference.

What came out of that was a discussion and ultimately an acceptance of a structured decision making process. And that still is I think our best hope of optimizing our decision making around these issues.

He also emphasized the fact that it's a societal decision because many of these things are a value issue. I value dredging, and I value ships where someone else maybe values winter flounder as much as I value the ships. And that's where we have our public input.

And as you know over the last 30 years public input has changed. It used to be that the public just wanted information. And then in the latter part of the '80s and '90s, the public wanted to be involved. And now in the 21st century, the public wants to be engaged. They want to be at the table. They want to be part of the decision making process. And if you leave them out, they exercise their political will, and that will stop the process just as quickly as any fish window.

The process Jerry outlined is dependent on two factors; having a body of scientists and having a body of engineers who will tackle the issues and bring a rational recommendation back to that stakeholder group.

Environmental Windows as Emerging Issues in Europe

By Mr. Neville Burt, HR Wallingford, United Kingdom

The National Academy held a workshop in Washington in March 2001, resulting in the recently published “A Process for Setting, Managing and Monitoring Environmental Windows for Dredging Projects” (NAS 2002). The author of this paper was invited to participate in the workshop and this provided a useful opportunity to learn how the concept of environmental windows was working in practice in the US as well as contributing something of the European experience to the working group discussion sessions. One year later this PIANC workshop now gives the opportunity to further review the concept and examine how it is emerging in Europe.

It would be arrogant in the extreme for this author to claim to represent Europe in the views expressed here. However, through involvement in the Environment Steering Committee (ESC) of the Central Dredging Association (CEDA) and the PIANC Environment Committee (Envicom) the author has had a number of opportunities for discussion across a broad spectrum of expertise and experience in countries in Europe. A number of individuals have contributed directly to the views expressed here.

One factor is common in all of the comments, that there are inherent problems in the concept which may not only unreasonably restrict dredging operations (with consequences for social and economic costs) but may actually increase the risk of environmental harm. These comments are discussed later in the paper.

The Preface of NAS (2002) states that “Environmental windows are those periods of the year when dredging and disposal activities may be carried out because regulators have determined that the adverse impacts associated with dredging and disposal can be reduced below critical thresholds during these periods. Environmental windows, therefore, are used as a management tool for reducing the potentially harmful impacts of dredging activities on aquatic resources.” Accepting this definition, for the moment, it focuses attention on identification of what the potential impacts are and what the critical thresholds are. The definition does not focus on the need or importance of the dredging project. Step 2D of the Process in NAS (2002) does recognise that these aspects need to be evaluated but states that “the template is designed for federal projects that have been pre-approved and for which funds have been appropriated.” This would appear to create an adversarial situation, the need for dredging having already been firmly established, the environmental lobby may well see themselves as the defenders against the attack of the dredgers. At the same time the dredgers are likely to cast themselves in the role of the defenders of common sense against the unreasonable demands of the environmental

lobby. Indeed such adversarial discussions took place in the plenary sessions of the workshop.

Dickerson et al. (1998) has defined Environmental Windows associated with dredging as temporal constraints on operations such that sensitive resources or their habitats may be protected from potentially detrimental effects. The windows are based on the assumption that potential conflicts or detrimental effects may be avoided if dredging or the placement of material is prevented during times when biological resources are most sensitive to disturbance.

This definition too requires a good knowledge of the environmental effects of dredging, which, it has to be admitted, is poor both in the US and in Europe. Because of this lack of knowledge the present climate of opinion demands that a precautionary approach be adopted, ie an assumption is made that unless dredging is prevented environmental damage will occur. Hopefully, in application, there would be at least a suspicion that there will be damage, before the approach is adopted and a restriction imposed.

In the USA the concept of Environmental Windows was introduced about 30 years ago and now about 80% of civil and maintenance dredging works are confined to specific periods of the year.

In Europe, until recently the majority of dredging operations have taken place all year round. However since the introduction of the EU Directives for the conservation of Natural Habitats and the protection of birds (Habitats Directive and Birds Directive) the effects of dredging operations have and are being considered in more detail leading to the idea of introducing the concept Environmental Windows.

Because the concept is in its infancy in Europe there is little experience to report and, inevitably, Europe has looked to the US experience to see what can be learned from it. This paper therefore focuses on how the American model might work in Europe. Two cases, one in Germany and one in the UK are briefly discussed. Some comments are also made with regard to the situation in Portugal before listing some general conclusions.

Potential impacts caused by dredging or disposal operations include:

- physical disturbance of nesting and spawning, destruction of habitats, especially

- disturbance of fish spawning habitats
 - physical removal of benthic faunal communities
 - physical removal of protected plants
 - disturbance of fish and benthic faunal feeding habitats

- detrimental effects of suspended sediments, turbidity and sedimentation, especially

- disturbance of fish spawning and nursery habitats
 - disturbance of fish larval development
 - effects on the behaviour of migrating fishes

- effects on feeding of larval, juvenile and adult fishes
- reduction of fish fitness and production, enhancement of mortality rate
- burial of benthic fauna communities
- disturbance of benthic fauna development
- enhancement of photosynthetic oxygen production of plankton algae
- burial of benthic plants

degradation of water quality, especially in zones with low energy and in waters with sediments with high organic content

- impairment of fish larval development
- impact on adult fishes (e. g. bioaccumulation)
- impact on benthic organisms
- enhancement of algal growth

hydraulic entrainment

- effects on juvenile and larval fishes
- effects on benthic fauna

disturbance of nesting and breeding activities by noise

disturbance of navigation

disruption of recreational activities

During disposal activities, the most commonly cited reason for environmental windows is the potential detrimental impact to anadromous fishes.

Environmental Window Assessment Procedure

This section of the paper refers to the technical evaluation itself rather than the step by step consultation process described in NAS (2002)

LaSalle et al. (1991) and Ault et al. (1998) recommended the following concept for evaluation of environmental windows:

Identification of critical periods:

At first, target populations for protection have to be determined. Critical times of development, and main time of growth, breeding, foraging, rearing, or migration have to be identified.

Risk assessment:

In periods of high biological activity assessment of the potential impacts of dredging or dredging disposal on resources of concern is required. Following operational characteristics are important:

Distance of disposal area to sensitive biological habitats:

A concern about possible environmental impacts occurs if the project is located in the vicinity of sensitive biological resources, especially nesting, spawning, and feeding grounds.

Distance to fish migrations:

In tidal waters, fish production significantly depends on anadromous fish migrations.

Sediment transport characteristics:

Potential impacts of dredging operations on benthic biological communities increase if sediment transport characteristics of project area favour sedimentation instead of resuspension. Planktonic life stages, e.g. fish larvae, exhibit great susceptibility to enhanced suspended sediment concentration.

Sediment transport characteristics are mainly influenced by hydrodynamic and geomorphological conditions of project area as well as composition and structure of the suspended material.

Relation to natural dynamics of water quality

In addition, the environmental impacts of disposal operations increase if concentrations of suspended sediments, nutrients and dissolved oxygen are expected to exceed natural concentration maxima or minima for that season. It can be expected that the existing biota is adapted to natural changes but might react to abbreviations from the normal range of variations

USACE District responses confirmed that dredging projects are often delayed and, in rare cases, cancelled because of restrictions.

The development of seasonal restrictions, which are environmentally and economically acceptable, requires a risk assessment with regard to a broad spectrum of project and site specific conditions. Thus, for each individual dredging or disposal project careful considerations of operational characteristics as well as physical, geomorphological, hydrodynamic, and biological attributes of the region are necessary.

The evaluation of environmental windows for individual dredging projects is frequently handicapped by a lack of information on environmental impact. In tidal waters, field studies on the effects of dredging or dredging disposal on biological resources are rare depending on strong dispersion of suspended sediments by tidal current and high natural dynamics of biological communities. Thus, no standardised tools for assessing the actual risk to resources of concern exist.

Discussion

Many areas of dredging operations are either in, or very close, to designated areas under the various European Directives and as such there is a legal obligation to ensure that activities are carried out in a way that do not cause detriment to features for which the areas have been designated. Features include flora, fauna, specific habitat types including estuaries as a whole. In many cases the designations have been made in the

knowledge that routine dredging operations have been undertaken for considerable periods of time.

There are often arguments that taking dredged material from the system affects the sediment balance and therefore has a detrimental effect on the designated area. If this is true then under the legislation the existing dredging practice should cease. To accommodate the legislation, suggestions have been made to re-deposit the material within the system, however this can also be opposed as it can have negative impacts in its own right and therefore has its own impacts that should be mitigated for.

The introduction of Environmental Windows using the existing American 'model' may not be feasible at many locations and has the potential to close a number of ports or require excessive over dredging to provide a sufficient siltation buffer to overcome the periods of dredging restriction. Thus in the latter case it is possible that the introduction of periods of no dredging would substantially increase costs, cause a greater intensity of dredging, perhaps needing an increase in size or number of vessels and cause morphological changes which could have long term negative impacts. In such cases it is possible the introduction of specific windows could actually cause detriment rather than prevent detriment.

Surveys in America have shown that many Environmental Windows have been set based on the perceived impact of dredging operations on a particular species rather than monitoring actual effects. Some studies have shown that the dredging has no measurable impact yet the windows have still been imposed. In such cases the restriction is unnecessary and only causes increased costs, potential inefficiency and as indicated above the potential greater impact on features in the longer term.

The window setting process in many areas is also not straight forward. Different species of flora and fauna may be present near to, or pass through, dredging locations and often the crucial periods for each are different and often the cumulative effect would result in an all year round restriction. In such cases a prioritisation process is required which is unlikely to be an easy decision particularly if there is only limited information available on actual likely impacts. Thus Environmental Windows do not protect the environment as a whole. Once a window has been set a decision is required as to whether dredging in that period can take place without any further restriction or whether mitigation measures are still required to help protect the other species which are likely to be affected, to a lesser extent during that period.

A potentially better approach for both the environment and the necessary requirement for dredging would be to base decisions around a weight of evidence approach using data and scientific knowledge to undertake a risk assessment of the potential impacts, with clearly defined specific monitoring to provide a feedback for future assessments. This should give a system for continuous improvement.

In this context the concept for evaluation recommended by LaSalle et al. (1991) and Ault et al. (1998). If all the impacts for the excavation and disposal process are

considered it could be argued that most impacts can be traced back to perhaps three route causes: direct removal of the resource with the dredged material; disturbance/supply of material to the water column; and noise. Thus providing ways to minimise these causes will reduce/eliminate a number of impacts.

The first can only be alleviated by reducing the dredging requirement. It could be argued that more frequent dredging for smaller amounts may not allow time for benthic recruitment (for example) therefore the removal would be limited. Applying say a 3 month dredging window may allow time for recruitment and therefore each dredge would potentially remove more of the resource.

The cause with the most potential for impact is the supply to the water column since this affects the suspended sediment content, turbidity, the means of remobilising contaminants and nutrients, and determines the potential for smothering affects.

The predicted extents of impact and magnitudes can then be compared to the resource location and thresholds of particular parameters (if established) for harm of the resource under consideration. If thresholds of harm are not known the range in natural variation must be an indicator of what the resource can withstand. In such cases a dredge management plan can be devised based around tidal cycles, lunar and seasonal cycles to minimise impacts with online monitoring (e.g Dissolved oxygen, turbidity etc) and agreed procedures should situations of concern arise.

In any risk assessment the scale of the operation must be considered with respect to the size of the water body, the rate of dredging and relocation, and the location of works relative to the main flows. For example, dredging an enclosed dock or a marina embayment is likely to be away from the main estuary or river flows therefore is unlikely to impact on migrating species therefore there is a low risk of impact to this resource. However the dredging of a navigation channel taking up much of the cross section of the water body could cause considerable risk. Thus individual dredge and disposal operations should be considered in their own right. A cumulative assessment may be required if several operations are planned in a small area at a similar time.

This concept relies on working with the environmental processes as a whole and only causes restrictions when there is an actual risk of detriment rather than a perceived risk. It should also identify which resource is of main concern for which a dredge management plan can be devised. Should the risk still be considered too high then a dredge exclusion period can still be imposed.

The emphasis therefore has changed from the environmental window being set up front when it may not be necessary to using it as a last resort when evidence suggests the risk of impact is too high. Also where there are different projects in area which may be of different type and scale the method may allow one but not the other rather than complete exclusion.

Allowing dredging to occur throughout the year in this controlled manner helps to reduce the magnitude and duration of effects at the expense of increased frequency.

Mitigation Methods

There is a strong feeling in Europe that technologies to control the environmental effects of dredging are more advanced in Europe than in the US. Thus, in applying the windows concept in Europe, there should be more flexibility allowed in defining the “safe” period. The series of Guidelines on Environmental Aspects of Dredging includes one on the technologies available (CEDA, 1998).

The extent of impact can be managed by the selection of equipment, control of rate of production, restriction of overspill, all integrated with a knowledge of the local hydrodynamics (from field measurements and modelling) and the natural variability of the system which determines the overall extents of the impacts and magnitudes.

Disposal operations also place material into the water column. Again the extent of impacts can be minimised by using the variation in the hydrodynamics to help control the extent and magnitude of impacts to acceptable levels.

Hamburg Experience

In Hamburg, seasonal restrictions on disposal (but not dredging) operations were formulated in an attempt to avoid potential effects of dredged material disposal on sensitive biological resources. Dredging operations are restricted from April until October in the tidal area of the River Elbe upstream of Hamburg Harbour. The reason is the very low oxygen content in the river in summer, very often near or below the level critical to fish life. The disposal of fine grained sediment would lead to oxygen consumption, lowering the oxygen levels even further.

The River Elbe is biologically characterised by a high fish production, a high benthic faunal population density, and species diversity. In addition, oxygen deficits regularly occur in the tidal regions of the river Elbe during periods of high biological activity. In the tidal Elbe, oxygen deficiency mainly results from reduced biogenic oxygen production of planktonic algae, and increased oxygen consumption by decomposition of suspended matter. At Hamburg Harbour and downstream, water depths and turbidity are increased. Accordingly, the light conditions deteriorate dramatically. Thus, in the tidal Elbe upstream of Hamburg Harbour biogenic oxygen production may be possible only at water surface.

Environmental impacts of disposal operations have been investigated extensively in Hamburg since 1994. Various studies have focused on sediment transport, effects on water quality, and benthic communities. In addition, literature on impact of disposal operations on biological organisms and oxygen regimes of tidal waters were studied.

In the area of disposal, significant impacts of disposal operations on both concentration of suspended sediments and oxygen regime could be detected in the near field in some cases. Generally these were short-term effects but potential long-term

effects can not be excluded. The natural variation of suspended matter in the tidal Elbe was high, so it was impossible to examine further the transport and final destination of the dredged material.

The investigations showed that impairments of biocenosis might occur due to the relocation of dredged material with associated high input of solids and variation of the water quality in some parts of the river, especially in shallow waters near the river bank. Here fish as well as benthic communities are living and have important nesting, spawning, and feeding grounds.

It was shown that the effects on oxygen content in the river and on the biocenosis mainly depend on the flow characteristics (discharge) and the composition of the dredged material. These effects can be minimised by moving the disposal site slightly.

It was concluded from this work that the environmental window presently applied was longer than it needed to be. More measurements, better understanding and new mitigation measures applied to the disposal have resulted in better public acceptance and a small opening of the window.

Port of London Experience

As part of their work in developing an environmentally responsible maintenance dredging strategy for the River Thames, the Port of London Authority (PLA) have been considering the extent to which the philosophy underlying the environmental windows concept is relevant, both to their needs and to the expectations of their stakeholders.

The PLA has a number of reservations about environmental windows for dredging, particularly having investigated the application of the concept in the US. In this context, the following points summarise the key considerations of the PLA in determining whether, and if so how, the concept might be applied satisfactorily on the River Thames.

Any decisions on environmental windows should be informed by science rather than speculation. It is important to avoid the situation, which appears to have happened historically in the US, where windows were determined in an overly precautionary or under-informed way, and have subsequently proved difficult to amend.

Before making any decisions about possible restrictions on dredging, it is essential both to understand the likely mechanism for a particular potential effect, and to set any likely impacts in the correct context (for example, in terms of the proportion of the resource likely to be affected and the ability of the population to satisfactorily recover from the loss of a number of individuals). It is not reasonable to assume that, simply because a species is present at a particular time, there will necessarily be an adverse impact.

The option of reducing potential impacts to acceptable levels via modifications to dredging operations (eg. reducing overflow) should always be investigated thoroughly before discussions about possible environmental windows are initiated.

If windows are required, and wherever it is scientifically possible and cost-effective to do so, they should be flexible - ie. the start and end points should be triggered by monitoring - rather than setting a precautionary time period which may prevent dredging for longer than is actually necessary.

If windows are to be set, the process for doing so must include the ability to revise existing windows as new information becomes available.

Portuguese Experience

In Portugal it is seen that problems may arise in applying Environmental Windows, mainly when the planning is not perfect and the economic resources are not adequate.

Certainly the principles could be implemented in certain dredging works (perhaps in routine maintenance dredging in Ports) but it can be at the same time a dangerous management tool.

Environmental Windows have not been introduced in a formal way but in some projects an attempt is made to adjust the periods of maximum activity to suit conditions, chiefly when dredging occurs near a sensitive area (because of fauna and flora preservation) or when the disposal activity could affect the normal use of the nearby beaches, i.e. June September.

The general aim is to prevent :

physical disturbance of nesting and spawning, destruction of habitats;

detrimental effects of suspended sediments, turbidity and sedimentation;

degradation of water quality, especially in zones with low energy and in waters with sediments with high organic content;

hydraulic entrainment;

disturbance of nesting and breeding activities by noise;

disturbance of navigation.

These aspects have been considered and some preventive measures were adopted in Portuguese estuaries (Cávado, Mondego, Tejo, Sado and Guadiana River) and in coastal lagoons areas (Aveiro, Faro).

Until recently the majority of dredging operations have taken place all year round. However, since the introduction of the EU Directives for the conservation of Natural Habitats and the protection of birds (Habitats Directive and Birds Directive) the effects of dredging operations are expected to be considered in more detail leading to the idea of evaluating the implications of the implementation of Environmental Windows.

In many case the transport of dredged material and the disposal activities have been restricted to the falling tide period, though this measure is not easy to enforce. Also

in many cases work is not carried out at night, so there is a "daily window". To these gaps certainly we have to add the "weather window". Thus the factors are cumulative.

"night window" + "weather window" + "tidal window" + "seasonal window".

It is possible that the introduction of more windows could actually cause detriment rather than prevent harm. Certainly, for a given location, this would originate the intensification of dredging activities in a few months, since, because of severe social and economic consequences, it is not admissible to think of closure of the ports.

Another consideration is that in less developed countries large dredges and disposal equipment are not close at hand to carry out the work intensively. The pressure is increased because WINDOWS in many countries will be at the same season, which has consequences for costs.

The introduction of Environmental Windows using the existing American 'model' may not be feasible at many locations and has the potential to close a number of ports or require excessive over dredging to provide a sufficient siltation buffer to overcome the periods of dredging restriction.

Concluding Remarks

Whilst Environmental Windows appears to be a simple tool to limit the environmental impacts, people directly involved in environmental dredging issues in Europe are concerned at the severity with which it is being applied in the US and would seek to avoid such problems in Europe. The concept places a great deal of pressure on those promoting a dredging operation to prove that it will not cause harm to the environment. Scientifically this is a very difficult thing to do for a number of reasons:

1. It is difficult to establish the baseline because few, if any things in nature exist in a steady state. This implies monitoring many years or life cycles of sensitive species and correlating their well being with other naturally varying parameters.
2. It then implies a knowledge of which parameters in dredging actually cause harm. Taking turbidity as an example, only a few attempts have been made at total measurement of the amount of sediment released during dredging. They are inherently very difficult to make because of the temporal and spatial variations in suspended solids concentration in three dimensions, not to mention the processes of settling, resuspension, turbulent mixing, hydrodynamic advection etc.
3. Next it is necessary to predict, again using turbidity as an example, the effects on the sensitive species. With a few exceptions very little has been done in the field to verify predicted impacts and laboratory experiments in general have not been conclusive.

All of this results in critical standards or windows being set based on something that is not yet capable of being measured or predicted and the actual environmental impact of which is hardly known.

The consequences of such restrictions are:

- Increased dredging costs arising from inefficient ways of working.
- The need for an extremely large fleet of dredgers because windows in many locations will be the same season. This would result in there being an over capacity in the no-dredging season and an under capacity in the dredging window. This too has consequences for costs.
- More intensive dredging in the limited period when it is allowed is likely to mean bigger dredgers or more of them, faster working, higher rates of sediment release etc. which could lead to more environmental damage.
- More use of overdredging to provide capacity for siltation for the period when dredging is not allowed which could also lead to more overall environmental damage.
- In extreme cases it could result in the closure of ports, with severe social and economic consequences

The author concludes that from a European perspective the Environmental Windows concept should be seen as a tool of last resort. Before it is applied, all reasonable attempts should be made to identify whether there is really likely to be any significant adverse effects and when mitigation methods are not sufficient to reduce the risk to an acceptable level.

In the face of these things the only solution would seem to be research to gain a better understanding of the actual effects of dredging as opposed to the perceived effects, and further investigation into ways of mitigating those impacts. Meanwhile there is an urgent need for technically informed and less adversarial dialogue between the dredgers and the regulators.

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The Dredging Process: Opportunities to Avoid Windows

By Dr. Donald Hayes, University of Utah

Thank you, Tom. Doug asked me to speak about ways, engineering ways, that we can avoid windows. This has been probably one of the most difficult presentations we have put together in a long time.

For one, of course, I work in 50 or 75 minute blocks, and I didn't think you wanted that version. But also I knew having been in a number of these meetings before to some degree, the problem is pretty well known. And Doug has illustrated that well this morning, as well as Jerry.

Now, we really understand the problem. The question is how do we get together? And so I'm going to try to provide some insight and information. And since most workshops go long, I chose to take a shortcut.

The first question is why do we restrict dredging anyway? Ostensibly our interest is to protect the aquatic species and habitat; right? That's what we're all about. Nobody wants to destroy habitat. That's not what we're in the business for. We would all like to see more fish and better habitat.

So we're concerned about suspended sediments that may impair either health or behavior, chemical constituents that might cause some kind of chronic or acute impacts to the biota, as well as sediment deposition that may affect either life stages or habitat. These are the problems that we've already addressed. They've been brought out this morning.

But that's not really why we have windows. The real reason we have windows is that we have a lot of misperception. We have some limited information, weak science. When we add those up, the agencies have chosen to use avoidance as the management tool. If we don't know what the problems are, we're not sure how to get to the answer, the certain solution is we just don't do it. And that's why we get the response from the agencies which we do. We're just not going to let you do it. That's the window idea. We're not sure what the impact is going to be during this time frame, so our choice is to not let you do it.

Now, I think this problem is really not as great as most people perceive. If you start on the impacts side, I suspect even though the science isn't perfect, if you look at what it takes to cause effects to the fish and really change their behavior, and I'm not a biologist, but my understanding as I read that literature is it's fairly substantial. It does occur. It shouldn't be minimized, but it's not something that happens easily. They're very resilient.

And we have to remember dredging is a temporary operation. It's not going on 365 days a year at the same location. It's always moving. It's always a different area.

On the other hand, probably the greatest misperception is with respect to the impacts that dredging causes. And I show one photograph here. It's a fairly typical bucket that we might see, and the visual impact is significant. We all look at that and we say oh, how terrible. Yet when we look at the data, the data shows pretty clearly and pretty consistently that the loss rates or the water quality impacts in almost all cases are far less than most people perceive.

For example, having measured many plumes, I will tell you that in most cases you'll have a very hard time finding a plume more than 300 meters downstream with any instrumentation, in almost all cases. Now, of course, that depends upon the currents and a variety of other factors. But with dispersment and settling, these go away pretty quickly. And you probably won't find a significant plume past a hundred meters or so.

Now, I would imagine if you talked to most people, their perception, like mine before I did this, would be much greater.

In one of the first research projects that we did, we set up stations. I think the farthest station we had was a little over 3,000 feet downstream, and we were concerned that might not be far enough. And you know what we saw: nothing. We wasted many, many samples because there was nothing there.

Yet, a lot of our work is in contaminated sediment. And the perception is that we don't want to dredge this because we're going to stir it all up and move it around. That's the perception; right? And that perception is an error. I think this is a case where we actually have a very practical problem, if we can talk about the sites. And I believe there's a lot of room for us to come together in the middle.

All right. Let's look at some opportunities for reducing windows-related problems. First off, let's talk about how we define the problem. You know as I was trying to put this together, what struck home was how much we are all in agreement with what the concerns are.

We did a small project for Tom back in the fall. And we set up some protocols and ideas about how to deal with windows in New York Harbor. I received the NAS report in February, and they're almost the same. Obviously, the NAS report was much more detailed and much more thorough. The concepts were the same, indicating we all really understand what the problem is.

We need to tie the impacts to the problem. We need to tie space, time, and concentrations with biological impacts and depositions. I hear about deposition a lot. And if you know much about plumes and dredging, you know that depositional effects outside the immediate vicinity of the dredge are almost nonexistent. It certainly may require some site specific studies.

We also need better knowledge. That's been brought out a number of times already today. We do need more resuspension data for a variety of conditions. We have a lot of anecdotal data, but dredging operations operate in many different areas and under many different conditions. Every condition is going to raise new problems, and we need to have better data to defend or at least justify what I think we already know.

We also need to improve our understanding and our modeling capabilities. Doug went over this, so I really won't spend much time. But it is important to be able to produce estimates that are reliable and understandable and believable.

Another alternative is performance criteria. Now, conceptually the idea of performance criteria makes a lot of sense. Where does this come in? It comes into solving windows. If you can work in this time frame within these criteria, then it's okay. Conceptually that makes a lot of sense. You establish what the criteria are. You have to live with them. And if you can, then that's great. It's certainly better than a strict prohibition, but it's very difficult to implement.

And again while we understand a lot about the dredging process, and we understand a lot about the impacts, we know a lot less. And I'll deal with this more in a minute about how to operate and implement performance criteria in a meaningful manner. We're talking about taking many samples, monitoring, trying to change operations, and the turnarounds just are difficult to accomplish. But if you're going to do it, you really need to be capable of compliance monitoring. We need to be able to show that we are successful. That's a big problem itself.

We also need some agreements for flexibility down the road, assuming that we're successful. I think you'll find in most cases we're willing to undertake fairly intense and relatively expensive efforts if we think at the end the situation is going to be improved. If we can show that the dredging operation doesn't have these impacts, we really shouldn't have to do them over and over again.

The real thing that Doug wanted me to talk about today was dredging controls, and the concept is really pretty simple. Can we reduce the source generation by either restricting the operation or modifying the equipment?

And I hear this a lot, that if we could just change the equipment or if we could just operate it correctly, we'd be in great shape. The advantages are pretty obvious. It's easy to implement. You could monitor compliance. It's not like taking water quality samples where you need many of them repetitively. If you can establish operation criteria, you can set them. They're easily measured, they're easily monitored. You can say yes, they actually work.

And there are no direct costs involved. There are many indirect costs. And those have already been brought up today; there are some additional costs that are associated

with any type of control. And certainly this is true when you start monkeying with the dredging operation itself.

Let's talk about some examples. With mechanical dredges, probably the most common control is restrictional overflow from the hopper barge. You simply allow them to fill the barge and stop before any spillage occurs. And I would argue that if you're concerned about resuspension, then this is a great place to start because it does have a significant effect, but it is not without cost. The economic load of the barge is far greater than when it was first filled in almost all cases. So, the perception that there's not a cost is clearly incorrect.

In many cases we see bucket selection as another alternative approach. Sometimes effectively, sometimes not. One of the problems we have is that it's sometimes hard to define the type of bucket that you might like to see used. More pragmatically, in a dredging operation it's more difficult to keep a bucket sealed. Ideally we would have buckets that wouldn't leak. The truth is that it's virtually impossible to do in a maintenance dredging operation. The operation itself is aggressive. It's mechanical. And rubber seals and caskets just aren't going to last very long.

So, you're going to get leakage. You also can't entirely seal the bucket, or else it will cause so much resuspension when the bucket hits the bottom. So, you have to have venting. And that venting, of course, allows some spillage as it comes up.

We do know, however, we have enough data to show that there are some advantages to enclosed buckets in terms of where the plume is located. We do know we get less resuspension at the surface, and we get more at the bottom. And there are some advantages to having that down at the bottom because of the transport.

One of the things that's become more popular, in the contaminated sediment arena, but I fear may move forward, is a cycle time. And with a bucket dredge specifically, you must use a cycle time of some minimal amount. The idea being we're trying to restrict an overly aggressive operator from causing undue water quality impacts. It's a great idea. The problem is it's difficult to implement. I was watching a project back last summer where someone had decided to implement a four-minute cycle time.

Now conceptually, that sounds okay because they're really going to have a slow operation, they're going to be careful. The problem was the water was about three feet deep. And so the operator did what any operator would likely do. He took his bucket, he dumped it in the barge, he moved it back over the water, and drank his coffee. He took his bucket, moved it over, came back, drank his coffee. It didn't accomplish the objectives.

And so I guess the message I'm trying to get across is that it's fine to implement these, but you need some science behind it. You need some logic, you need to make sure it's going to accomplish what you want to do, because there is an impact. There is an

economic cost, and you really shouldn't be doing it unless you're going to get something for it.

We talk about hoist and drop speed. Again, it is very logical that we don't slam the bucket to the bottom. We don't raise it at some aggressive rate. But we are not far enough at this time, at least from my perspective, to define what is acceptable and what's not. I hope we'll get better, but right now I'm not sure we're able to do that.

In cutterhead dredges, a common criteria that someone might restrict is swing speed. How fast can they actually swing the dredge itself, how fast the cutter itself may rotate as well as the maximum dredging depth. And we have data that clearly show that all these can impact resuspension.

However, if you look at the data more closely, what you find is that those impacts are very minimal, except outside of normal operating conditions. In other words, can you increase your cutter speed to the point that it increases resuspension? The answer is probably yes.

But in most cases under normal conditions, the operator would not be trying to do that anyway because in soft sediments, they really wouldn't need a cutter to turn very fast, and that's when it would have an impact.

The same with swing speed. You can only feed the dredge at a certain rate, the rate which the plume can handle. At that rate, it's probably fine. Now, if you start getting overly aggressive and you feed the plume more sediment than it can accept, sure you're going to have increased losses.

One of the problems, though, is that when you combine these three, and these are probably the three areas that I see most often. We often end up restricting the production of the operation and somewhat arbitrarily extending it. And by doing so, we probably don't reduce resuspension at all or if at all very little. So, actually we're exacerbating the problem we're trying to solve.

And so I get asked often about developing controls, and I usually tell people that I don't think I know enough to develop these very well. And I think I know more about it than many other people do. And so I worry when I'm on projects and somebody has instigated one of these controls. And I doubt that they're very often based upon real sound science.

There are site controls as well. The concept there is pretty simple. It's to limit transport. We can't limit what happens at the dredging operation, but we limit how far it goes. Primarily here we're talking about silt curtains. And again, they're relatively easy to implement, and you can monitor the compliance. Is it in place, or is it not in place? That's convenient.

Mainly we're talking about silt curtains and screens. Certainly they work and have been shown to work well under appropriate conditions. We do know that it's almost impossible for them to entirely restrict the plume. And in most cases, there will be some flow underneath. But that's not necessarily a bad thing because we will have moved the suspended sediment closer to the bottom which means it will settle more quickly and will shorten the duration of the plume.

But again there are some costs. They are expensive to purchase. They're also expensive to maintain, particularly in the wrong conditions, and they're not effective. So, again a good idea that has some great use if it's done in the right manner, but not in the wrong.

Lastly monitoring. Actually this seems like the real panacea; we'll just monitor everything. I've monitored many dredging operations, and I can tell you it's a very difficult effort. In fact, Neville has written a short protocol on how to go about doing it, and it's expensive. It takes a lot of equipment. It's not a simple operation. You're not going to go out and take three samples and have any measurable or useful compliance information.

So, you have to in the beginning agree that you're going to have some feedback in the decision making process. And you're going to get a data set that's going to improve your knowledge in some manner. And your goal would be that if you can do that, hopefully in the next realm you shouldn't have to go back and have that intense of an effort again. Again, it's one thing to have a one-time or a two-time very intense monitoring effort, but you cannot do this on a continuous basis. Again, I've done it. I promise you that you just cannot possibly do it.

The monitoring certainly needs to be designed to meet the objectives, and again a single point of actual concern. There is some hope of automated monitoring, and I've been working on a system I'm not quite ready to talk about that might help some of this. And the idea would be they'd be able to do an automated monitoring effort that you could watch as you go along. So, that's really all I have. I guess at the end we'll take some questions.

Session Summary, Environmental Windows Workshop

By Mr. Thomas Wakeman, Port Authority of New York and New Jersey

Thank you, Ellen. Ellen speaks very vigorously about her position with industry and the need for dredging to go on and projects to be done.

I assure you there are advocates on the other side who speak just as vigorously about fisheries, the loss of resources, decline of our environment, and the need to do things differently.

The west coast is really under the influence of the Endangered Species Act, which is an act that protects individuals from take. There are a number of species in the bay area that are classified as endangered species or are on the list as threatened. The same thing goes for the Columbia River and the Puget Sound.

A different act is the Essential Fish Habitat Act which came in 1977, which says rather than protecting individuals, we will protect their habitat. Because without an apartment house, there's no place for these critters to live.

The difference between the two is you don't have to have any fish there to protect the habitat. And the National Marine Fisheries Service (NMFS) had the responsibility of going through and identifying all the critical fish habitat and all of the coastal estuaries and coastal resources.

How that is playing out is those are advisory recommendations to Federal agencies. However as Neville said, the project can be done. It can be through the Federal process. A permit application must be filed with the Federal government and will go out on public notice. To get the permit, you have to get a Water Quality Certificate from the states that that operation occurs in.

The states can see the NMFS recommendations, the conservation recommendations from the national agencies, and they can say, I am going to put a restriction on your Water Quality Certificate to protect the resources that the National Marine Fisheries Service says must be protected.

And if they don't do these things, particularly if you happen to be between two states, one which does and one which doesn't, let me tell you the next time around, both of them will have to deal with the ridicule of not protecting the resources for their state.

I'd like to go through one last presentation. I apologize for this, but I'm trying in ten minutes to talk a little bit about the negotiations. And in the world of dredging right now a lot of this is about getting the right people to the table and negotiating. As long as

those people don't retire or turn over or something else, you can generally pool those agreements.

Unfortunately people like Frank McDonough moved on to new positions, and the agreements we put in place at the end of our navigation study-- what we call our 50 foot study, and the agreements to help others understand the impacts of that have not been acted on because Frank left for a new job. The person who happened to be the head for the Corps district left and went to another job. I was moved on to another job. And a new set of characters came in and it didn't turn out the same way, and a lot of people now have credibility issues around that.

This is about trying to do the right thing. And I think all of us are environmentalists, and we're all trying to do the right thing. So, how do you get win/win strategies?

In New York, unlike other parts of the country, we didn't have to worry about endangered species because we killed them all before the act was passed. Our problem now is they're coming back.

At the same time we have a 300 year old port, which actually had its last improvement in infrastructure in the mid '70s, first generation of containerization. It is now at the backside of the wave of the third generation and trying to move into that next century. This century now.

The 50 foot harbor feeds seven different regions in the port. There are two 41 foot projects underway right now, one at Port Jersey, and one at Arthur Kill. There is a 45 foot project through the Kill Van Kull and up into Newark Bay, plus, we have an authorized 50 foot improvement project.

It seemed ridiculous to be doing all of these in a sequential order. Instead let's see if we can do some of this work together. The ongoing project in the Kill Van Kull and Newark Bay to 45 feet is about 60 percent done.

At Bergen Point is the latest contract. That contract is mainly in rock. The area 4 was being drilled and blasted, and the residents in Staten Island and Bayonne were getting very aggravated with hearing that noise repeatedly.

So here this area is going to be drilled and blasted to 45. And at some point in the future will be drilled and blasted to 50. Why not do it as a piggyback? On the back of the Corps' project go from 45 down to 50. That has to be done as a permit action. We had a public hearing. In general it's the first public hearing I've been to in the metropolitan region where there were more people speaking in favor of the project than opposed to it. It was a very pleasant public hearing compared to a lot of the other ones I have been to.

The concept is very simple. There is an existing channel of 40 feet. The Corps is going to 45. We'll do a permit action, put up about -- well, I won't tell you the numbers -- and go down to 50. Do it all at the same time, save the citizens the impacts of noise.

Now, we knew there were existing windows. But at this point similar to what Ellen was talking about, some of these windows were already in place when we recognized that they could possibly influence the project. They were not influencing the 45 foot project because that was grandfathered. They would influence our 50 foot project because this is new work.

So, we got a letter back from National Marine Fisheries Service that said, no drilling or blasting from the Bayonne Bridge, which is essentially the green line right there west from essentially March to June.

This now takes our project and extends it another year. So, the drilling and blasting is going to go on more because of our permit action. So, the fact that these agencies really are not interested in stopping jobs, they do want to protect the resource. And the winter flounder is a resource that uses the tidal flats off to this area and off to this area and, in fact, in this area as well.

We look for ways to find the greater economic, environmental, and social benefits. They understood that if they came out and said absolutely not, that this blasting can't go on, then the residents of Staten Island and Bayonne are going to go why are you guys doing this to us? You know, we recognize the fish are important, but so are we.

So, we worked to find some trade-offs. So, we accepted that they wanted an area about 500 feet off of the flats to protect the fish. When you put the windows that we're talking about here, and the windows we're talking about up there together and the new contract is going to be here, we're back to there's no place to go for about four or five months a year.

Now, the question is should we go back to what was, continue to do the 45s and 41s as they were, subject the region to this construction over about the next 15 years, or should we go ahead and accept the fact that we've got some windows and figure out how we deal with them?

And the way we're dealing with it is by seeing if indeed the dredge material when excavated in this region is moving into the flats and possibly influencing the habitat.

Why do I say habitat versus species? Because there aren't any winter flounder here. Two years' worth of sampling by the Corps, all they found were three eggs.

So, we're going to do this, and that's our approach. We're starting at that end because earlier there had been a similar job down there at Arthur Kill here where the windows were put on for seven months.

You can't do anything different than maintenance work, which is routine short periods of time every year, and you can move around in the year. Generally if you've noticed the windows are December, January, February. That's when you can dredge; the winter period when nothing is going on, the lakes are frozen, so forth and so on.

The rest of the year you have active biological populations. So, what we're trying to do is figure out how do you take care of both. What we're proposing is there is synergy to be found somewhere in here.

Navigation projects are the projects the Corps of Engineers is trying to put in place. They tie very critically toward our port projects. The investments are driving the investors on this side of the bulkhead, and they're all about \$5 billion over the next ten years.

But they have to be dovetailed with the environmental considerations because the environmental community said point blank we're not going to allow you to invest in the economic development of this port if you don't likewise make an economic investment in the resources of this region. In other words, the estuary's resources.

So, the Corps of Engineers now has the Hudson Raritan Restoration Study, which goes hand and glove with the USEPA Comprehensive Conservation and Management Plan and what the goals are there. And the Port Authority put up \$60 million to buy 6 pieces of property to do restoration. So we now have elements of navigation improvements, port development, and environmental restoration that are underway. If you put the three together, you get synergy and what we call a world-class harbor-estuary.

In closing, to get a world-class harbor-estuary, there must be knowledgeable people that work together to find ways to simultaneously achieve development and environmental protection.

Environmental Windows Workshop Discussion

Environmental Windows Workshop Session Summary: Remarks by Mr. Dominic Izzo,
Principal Deputy Assistant Secretary of the Army (Civil Works)

MR. IZZO: Actually I didn't have any formal comments, but I was so inspired by the presentations this morning, I just wanted a few words.

First of all, it's absolutely delightful to be here and see a bunch of engineers and scientists talking instead of trying to go through these concepts in the rarefied political atmosphere of Washington, where it really does get very difficult and people get very, very emotional. So, I really commend you for getting together and trying to discuss these things in a factual way. It's really a pleasure to be here.

And I have to make a confession to you all. Not only am I a coastal engineer who has actually studied hydrodynamics and sediment transport, which probably makes me really out on the fringe, but I'm also a dedicated hook and bullet conservationist. I used to think I was an environmentalist, but after going into the Everglades and meeting the true environmentalists, I know that I am really a hook and bullet conservationist.

So, I'm delighted to see presentations on the Pacific Northwest's salmon and flounder. I share your frustration with New York Harbor because I grew up on the banks of the beautiful Passaic River, which as you may or may not know is just north of that area where they're doing all the dredging, and is I believe the super fund site because of the chemicals and so forth that have been put in there over the years.

But I didn't want to get into all that. While I was sitting there, I was just thinking that this reinforces my feeling that the Corps is on the right track. And the Corps is really, for a military organization, very, very open. And they are pushing the collaborative planning process and partnering with all different types of folks. I was fascinated to find out that of the 35,000 corps employees, 1,251 are now biologists. And I submit to you that shows an organization that has changed quite a bit since we started dredging back in the late 19th century.

But we're really moving on this collaborative track. And the Army and the bureaucracy that is the Corps of Engineers is going to a watershed based planning methodology that is also collaborative and brings in all these other Federal agencies as well as concerned groups and industries and so forth.

That's what we've done down in the Everglades to produce a comprehensive Everglades Restoration Plan. And it really is amazing. It was very painful I'm sure. They've been working on it for over ten years, but it brought together the diverse groups in southern Florida, and it actually reached a consensus on how to go forward and save

the Everglades and oh, by the way, still provide flood protection and water supply for future growth.

And I personally think it's a triumph of policy down there in Florida. And what we would like to do is to see that expand into other areas such as San Francisco Bay, the Pacific Northwest and so forth.

And what it requires is for folks to invest a lot of time to exchange information, to find out where the truth is, and then you can actually come up with a plan that not only saves the flounder and the salmon, but also saves the navigation industry and our prosperity.

Because I will tell you, having worked overseas for about ten years in some very desperate places, that if you want to see true environmental wellbeing, you come to prosperous countries, and we're the most prosperous country. And I guarantee you you'll not find a better environmental climate anywhere, nor will you find better fish and wildlife.

So, I think we're on the right track, and I wanted to say that to y'all. I'll have more remarks this afternoon. I did want to also point out, because if you listen to all these discussions too long, you'll think we haven't made a lot of progress.

Like I said, I grew up on the banks of the Passaic River. And I remember driving from south Jersey crossing the Perth Amboy Bridge and coughing because the pollution from the refineries was so bad that it choked you. That's all gone now. It's pretty good. Much as L.A. has improved dramatically since I went to grad school there in 1980.

And I can tell you if you don't know that in the 1990's we saw wonderful growth in waterfowl in this country, nice rebound in populations. And if you think about it, I don't believe there is an endangered species of waterfowl in the lower 48 states, even though there are something like half a million of dedicated hunters who go out every year and try to kill them. So, that tells you that we can be very successful.

I also note that this year we had our first fishing season for salmon species on the Columbia in many years. So, when you're listening to all these discussions, and you get very frustrated and you think that maybe the world is going to be over tomorrow or your kid will never be able to go fishing or that the navigation industry is going to crash, I don't think that's going to happen. I'm an optimist. I think the economy will continue to grow, and I think we'll have fish and wildlife there for our children and our children's children as long as we keep working together.

And you really did a lot for me this morning, just listening to all this discussion. Please keep up the good work. Thank you.

MR. WAKEMAN: Do members of our panel want to say anything? Jerry.

MR. SCHUBEL: I want to reinforce something that a number of people have said, and Sye simply reminded me at the break. In all of this adaptive management, while it's been implicit, we need to make it explicit.

Because if we have this kind of a process, it really ought to be adaptive management. Every time you set a window, it ought to be an experiment. An experiment that you revisit at the end of the season, and you ask yourself whether it should be expanded or compressed.

The other thing we're talking about is books to read. John King, a political scientist at the University of Michigan years ago, wrote a wonderful book. It was about decisionmaking. In that book he described the governance model that he felt characterized the government at all levels. And it was called, "The Garbage Can Model of Governance".

And it's perfect because in the garbage can you have three streams that flow independently: problems, policies, and politics. And the trick is, because they each have their own watershed, they each have their own channel, the trick is to see if you can orchestrate them to come together.

Because it's only when those streams intersect that you can make changes in the way we do business. And again, it's getting people to the table, keeping them there, having them listen to the discussions. That's our only hope to orchestrate getting these streams to intersect. And then in that window when they come together, that's when you make changes in how we do business. And I think you're on the right track.

MR. WAKEMAN: Anybody in the audience would like to say something, burning to say something?

TODD BRIDGES: I've seen the academy process a couple of times in presentations only. I've not read the book yet. And I've made this comment before. There is a lot of parallel between what's being proposed here, and what I understand as environmental risk assessment, from the standpoint of how chemical contamination and impacts associated with that are evaluated.

And I'd like to strongly encourage that if there is another go round with the national academy or there's a reiteration for building on that process, that a close look be given to what has been done in developing an analysis framework for environmental risk assessment. I think it has a lot to offer, particularly when you're trying to infuse this with what people have been calling sound science.

Because in my mind it's not sound science until you generate tests for hypotheses. And that's going to require developing detailed conceptual models regarding what you think is going on, what the resources concerned are, how they come in contact with the

stress, what mechanism is involved that Neville mentioned, by which these resources are actually affected by that stress.

And really I think from the standpoint of engineering, it's more than just defining how you can modify the project to reduce turbidity. It's really looking to our engineers to help us to find what this exposure level is like.

So, it's not just how can you modify your project. Tell me what the concentration of this stress is in the environment. And so then if you have both of those, you're actually in a position to actually do the analysis.

And it's as parallel as anything can be to what has been done in this country for more than 20 years now, using environmental risk assessments to make decisions. I mean you also have to have all these stakeholders and everything.

So, I'm really talking about something that's an analysis framework more than maybe a decision making framework, but I think they're complimentary.

MR. WAKEMAN: Thank you, Todd. An analysis framework is something we probably can tackle. Decision making framework almost requires you know who the people are at the table and where they're coming from at the time.

Joedy Cambridge happens to be here from the National Academy. And Joedy has shepherded a lot of projects through and is familiar with this one. Would you say a few words about where you think the academy might be at this point with respect to a follow-up to the earlier workshop that they hosted?

MS. CAMBRIDGE: Well, let me just say we have the documents. The second is Phase II of this, looking at the implementation. We had some preliminary discussions with people at the Corps of Engineers' headquarters as well as folks down here.

Tom and Ellen and I met with the head of our policy division just a few weeks ago to talk about this. And there are different approaches that we feel could be taken on this. One might be to do some sort of a larger national-type symposium to put some of these issues out on the table. We could convene a full NRC study committee and do a formal Phase II like what Jerry did.

There are a lot of different approaches, but obviously we need some support to go about this. I think we've had a couple of volunteers in terms of doing some case studies on this.

I'd also like to say that anybody who's interested in seeing the report who hasn't already gotten a copy, give me a card and I will send you a hard copy of it. Otherwise, it is accessible from our web site. If you go to TRB.org and click on marine board, you'll get direct access to the report from there. But we're certainly here standing ready and are certainly prepared to go on with another phase on this.

And I have to say just from experience in the last few months, the NRC has speeded up some of its processes. And by doing the phase II doesn't necessarily mean that we're going to be two years farther out on this whole thing before we look at how this could be implemented. We've got strategies and approaches that we can take to some of these things that could certainly shorten that time frame considerably and hopefully we can consider that.

MR. WAKEMAN: Thank you.

MR. CALLAGERY: My name is Bob Callagery. I worked in the Corps for many years and retired recently, and I worked in the Philadelphia district. And now I work with Cohagen and Bryan. And I just want to go back to a point that the gentleman from England brought up. Whenever you bring people in the room, it's very, very critical. And I'm an economist, so I'm going to talk the way an economist talks.

People have different objective functions, and it's very, very critical that you figure out a way to get everyone to recognize they're going to have to suboptimize. People are going to have to give up something in order for everyone in the room to go forward together. And until we can get people to acknowledge the need to go forward on all fronts, not just to protect the environment or not just to dredge, it's very, very difficult to get these processes to lead you to a conclusion.

And you may run into "there's never enough science." When I was in Philadelphia, we had more dredging windows probably than this building. We had windows for anadromous fish and for oysters. We had windows for turtles. We had windows for sturgeon. We had windows for winter flounder. They were all there.

And every time we attempted to convene people and work, we might be able to get a specific window adjusted, a window for sturgeon or a window for this. But in the overall context of dredging, we could never get everyone together and say all right, we all acknowledge that dredging has to go forward. How can we now sit down and look at our mandate, which is to protect the environment and figure out a way to compromise that? And that's a very, very difficult thing.

I'm hopeful that these processes might help, but I think you've got to get back to making need a critical part and acknowledgment of everybody in the process.

MR. WAKEMAN: Peg is very familiar with the Columbia River and the things that are occurring on the Columbia River. Would you make a few comments, please? Introduce yourself and make a few comments about how a template as Todd described might be useful to you or not.

MS. JOHNSON: I'm Peg Johnson. Well, I really agree with Mr. Schubel about this being a social process. I think it's long overdue that we recognize that. And I kind of like the whole social process thing better than the political process.

I am concerned as I sit here about pilot programs, with all due respect, Ellen. Ellen is my esteemed colleague because of what we saw at the very beginning today. And I don't remember if it was Doug or it might have been Sye who talked about the infinite variables in a system and the different parts of the estuary, and I think Sye said he's going to represent the fish.

And I thought well, you know, what if the mackerel decided it was going to represent all the tall 50 year old women with brown hair, you know. I wouldn't want that either.

So, I guess I'm just worried we keep looking for definitive answers in science that we can take to the public and say well, this is what happens. But all we can do, even with the best models and the best science is make some half good guess at what a fish or dredge sediment or anything might do at any given time. I do believe it's a process, the success of which is going to hinge more on consensus and social interaction, political interaction, and giving. We've got to understand that it's really important to build those estuaries back, you know. Those are really important, and we're all environmentalists.

MR. WAKEMAN: Thank you, Peg. Anybody else? Well, I'm not one to sit and look at one another. If there's nothing else to be said, I'll give our president the last shot.

MR. EEDE: I'm presently the President of PIANC. Of course, I fully back Neville. I want to say, those windows, they look like a pretty simple idea, but in my opinion simple ideas often result in difficult situations, and this is what is going on here in the U.S.

From my perspective in my country in Belgium, the only windows we have nowadays are windows that are now installed due to environmental facts, and due to the fact that recreational navigation should go undisturbed by dredging. So, I hope we can keep it this way and even look back from that. So, thank you.

MR. WAKEMAN: I'd like to thank all the panelists and thank you for sitting with us and sharing your time. This dialogue will continue. And it's been a pleasure this morning to find a group of people that are willing to sit and talk when it's not a crisis at the moment.

It seems too much of our decision making is done under those circumstances. I am a supporter of a new wave of NRC work. And the Port Authority of New York and New Jersey, as long as they don't take the money that's currently earmarked for that and ship it to lower Manhattan, would be willing to support another round.

And I think more along the lines that Todd was talking, of a template, an analysis template that allows us to organize the data and identify where the data gaps are and allow people to see how the decision making, the process works.

Right now, too much of it is very ephemeral. And if you don't know what happened that day in the room, you don't know how you got the decision. And then when

we try to replicate that later on, we have to start all over again, and it takes months. So with that, thank you for being another iteration in this ongoing dialogue. And thank you, Mr. Izzo, for joining us as well.

Inland Electronic Navigation Workshop

Inland Electronic Navigation Workshop Introduction

By Dr. Larry L. Daggett, Waterway Simulation Technology, Inc.

Let's go ahead and start as close as we can to the time. My name is Larry Daggett. I've been asked to chair the Inland Water Committee for the PIANC, the U.S. Section of PIANC. I would like to ask anybody that's here that's interested in being involved in that committee to let me know because frankly the committee had become inactive, and there wasn't much leadership going on.

Tom Ballentine asked me if I was interested in trying to reactivate it in getting it started. We had a meeting at the National Waterway Conference last year and found that there was some interest in that. We decided the best thing to do is to start off by getting active. We asked about setting up this workshop because one of the topics that I think of great interest is this inland navigation electronic navigation systems, and in particular the charting part of that.

Tony Niles and I talked, and Tony had suggested that this would be a very good topic. We worked out an outline, and we're going to proceed with that. Basically about the first hour is going to talk about the systems that are available today. An initiative that the Corps of Engineers has started to help improve the charting data that goes into the charts.

I think this has been one place that has been a problem and has been holding back some of the. It certainly is not making any confidence in the system as high as we would like to see it be for good navigation.

Then we're going to talk about some standards, and then we've got an hour set aside to have a number of vendors make some presentations about their system. What we've asked them to do is talk about the good things about their system, some things that are very positive about their system and places where they feel like there might be some limitations and some things that might be done to overcome those.

Since we've got six of them, we've got 60 minutes. That's about ten minutes a piece. So, I'm not given much time to go into the negatives. But we'll let them complain to us as much as they need to, and hopefully we'll hear them.

The whole goal of this is at the end, we'd like to have some response from the audience out there. We hope there's a number of towing industry people that can give us some feedback about their experiences so far and what they've learned and make some suggestions. We'd like to come up with some ideas about where we go from here.

For everybody's interest, there is a recording being made of this. They're recording on video as well as a court reporter over here recording this. We'll come out with some transcripts, and there will be a proceeding of this whole conference produced. You may not have known that. Probably most of you didn't know that. So, be careful what you say and how much you say.

I actually have had a personal interest in this for some time. I guess it was probably about twelve, may even be fifteen years because we were asked by the Lower Mississippi Valley Division at that time, which is now Mississippi Valley Division of the Corps to work with them to take some data that they had and a new system that they were putting together, which was called REGIS and create some navigation charts that could be used on the waterway.

We did that, and we demonstrated those on the MV Mississippi for several seasons. We set a system up in a pilot house. We had a lot of interest in that, and then we worked within the corps trying to get the best data made available. We worked with NOAA and Coast Guard trying to really see the development of this electronic inland navigation system developed.

So, I'm glad to see that it's still working. I've kept contact with some of the companies. I'm no longer with the Corps now. I'm working in a private consulting firm of my own, but I'm still interested and I'm very anxious to hear what's going on today and where we stand in the system.

We're going to start with Fred Ganjon who's going to talk about systems available today, the good and the bad. And we'll follow that to Tony Niles. Tony will talk some about the Corps of Engineers activities and plans then Fred will get back up and talk to us about some RTCM standards. Fred worked for NOAA until he retired and was involved with some of the early ECDIS work and converting charts into the digital form, vector form, and all the early struggles that went on with that. He has since retired and is now President of IIC Technologies and CARIS. He's gotten involved in the private world and says he loves being a businessman now.

So, Fred, you want to tell us a little bit about what kind of systems are out there today.

Electronic Charts 101

By Fred Ganjon, IIC Technologies, Inc.

Thank you, Larry. Time is short, and I was asked to set the stage. So what I've got here is an introductory course, Electronic Charts 101.

Just quickly I did a bit of research on this over the last couple of years. And as near as I can tell, the first systems that used the concepts that we consider to be electronic charting came about in 1979 and 1980 in a couple of different places.

These early systems were monochrome. They weren't very fancy, but they had many of the ideas that we see today. And within just a few years, they had developed full-color displays and integrated with positioning systems. In those days the positioning was from LORAN and radar.

We actually had the basic concepts of ECDIS, and by 1984 we had radar integrated with this technology. And then, about 1984 there was just a plethora of other companies that popped up, big companies and little companies operating out of somebody's garage that went from two or three people making a system to a couple dozen, and some of those are even here today.

In 1986 the international community first started looking at standards. The international maritime community and the international hydrographic community got together with the North Sea Hydrographic Commission, I believe in February, 1986, and decided that this is something that needed to be looked at in terms of uniform international standards.

Here in the U.S. The Radio Technical Commission for Maritime Services, RTCM, established a committee to take a look at standards for this technology. The RTCM Committee met for the first time in June, 1986.

In 1989 the formal IMO process started. And in 1995 IMO adopted a standard that was considered to be the world standard for SOLAS class shipping. So, that's really pretty fast.

And now here we are in 2002, and we are looking at the benefits of all this work that has gone on before. I hate to do this to you, but I'm going to give you some definitions.

And the reason I'm doing this is if you understand the definitions, you understand the terminology that's going to be flipped around by the manufacturers, and I think it's useful.

ECDIS, Electronic Chart Display and Information System -- This is the system that is defined by the IMO standard. And it means a navigation information system

which with adequate back-up arrangements can be accepted as complying with the up-to-date chart required by Regulation V/20 of the SOLAS Convention by displaying selected information from a system electronic navigational chart with positional information from navigation sensors to assist the mariner in route planning and route monitoring and by displaying additional navigation-related information.

Let me cut to the chase. You have to have adequate back-up arrangements. You have to have information (data) from an electronic navigational chart (ENC). You have to have positional information such as provided by GPS, and it only applies to SOLAS class vessels. You're not dealing with SOLAS here on the river. Therefore, in a way you don't have to worry about it, but this is the international standard and it's worth understanding. You have to be connected to navigation centers. In today's world that's GPS.

System Electronic Navigational Chart. This SENC was mentioned in that last definition. So what's an SENC? It means the database resulting from the transformation of the ENC by the ECDIS system. It is the database that is actually accessed by ECDIS for the display generation and other navigational functions, and it is the equivalent to an up-to-date paper chart.

Electronic Navigational Chart. ENC -- I'm sorry, all these definitions tend to collapse on each other. Electronic Navigation Chart. This means the database standardized as to content, structure, and format issued for use with ECDIS on the authority of a government-authorized hydrographic office.

The ENC contains all the chart information necessary for safe navigation, and it may contain supplemental information in addition to that contained on the paper chart such as sailing directions, which may be considered necessary for safe navigation.

Okay. This is the fuel. This is the data on which the system runs. What's the difference between the ENC and the SENC? It's assumed that many of the systems will not use the ENC directly. They have to take it and digest it, transform it within the system to some internal format. That's the SENC that I just talked about before.

When Tony gets up and does his bit, he's going to deal with the ENC that the Corps is going to produce.

Okay, to summarize a bit. ECDIS. In order to meet the standard for ECDIS, the system has to be type-approved based on these IMO standards. It has to be connected to navigation sensors, has to have adequate back-up, has to use an official database that is up-to-date with the proper content and structure and format.

Now if it doesn't do all of this, it's not an ECDIS. And everything that's not an ECDIS is called an Electronic Chart System, an ECS.

The good news is there are a lot of these systems out there, and they're really quite good. And for the most part, that's what you're dealing with on the river.

After IMO created the performance standards for ECDIS, they were asked by several countries to create performance standards for ECS.

Initially they said no. Well, when they were working on the ECDIS standard, they kept saying wait until this is done, wait until this is done. We'll do ECDIS now, then we'll do the ECS later.

After the ECDIS performance standard was actually completed, IMO came back and said, you know, we really don't want to do this because it doesn't deal with SOLAS. It has to be ECDIS in order for SOLAS to use it. So, we have no interest in dealing with ECS as a stand-alone piece of equipment, and they just walked away from it.

RTCM at that point decided to pick this up and start working on performance standards for ECS. It's not unusual for RTCM to do this.

And, in fact, in 1986 before IMO actually started on the ECDIS performance standard, RTCM had worked on a standard. And that initial effort by RTCM ended up being turned over to IMO back in 1989 as one of their starting points.

So, RTCM came back to it and said okay, we will work on this performance standard for ECS. And we will do it on the basis of what we see here in the United States, but we'll accept input from other countries as well if they are interested. That's just a bit of history.

The Special Committee 109 for Electronic Charts was established in 1986. The present document that we're working with is the RTCM Recommended Performance Standard for ECS, Draft Version 3.0.

It's important to note that RTCM is being supported in this effort by U.S. Coast Guard, NOAA, the Italian Hydrographic Office, and several ECS manufacturers.

It's noteworthy that the Italian Hydrographic Office is involved. This is a hydrographic office from over in Europe that has a requirement for ECS standards. They looked around to see who was doing anything with ECS and they determined that RTCM was basically the only game in town. They elected to participate with us, and it's been a useful association.

Now, why is the Coast Guard, for instance, interested in this? Very specifically, without putting the lieutenant on the spot here, Captain Ross several years ago came to us at RTCM and said, "Look, as we move toward the implementation of AIS, the requirements that are likely to go in place will require ships in certain port areas to carry AIS transponders."

“The requirement will be to broadcast the information. The requirement probably will not include actually collecting the information from other vessels and viewing it.”

“However, when a master is on his bridge, and he knows that all these other ships around him are providing information about their location, their speed, etc., if he knows that's available, why wouldn't he want to look at it?”

And, in fact, most of them are very interested in seeing this AIS information.

The question is what is he going to use to look at it ? What type of device is out there that can collect this AIS information and display it?

And it turns out that an electronic chart system is one of the ideal viewers for AIS information. ECDIS would be ideal. But if a ship doesn't have an ECDIS, do they really want to invest all the money that's necessary for a full-blown ECDIS? Why not just an ECS?

And so the Coast Guard was determined to have that option available. And in order for Coast Guard to consider the use of ECS as an AIS display device, they had to have something that they could type-approve. Therefore, they needed standards. And that is the primary reason why the Coast Guard has been so involved in the development of these RTCM standards.

NOAA has also been involved. From the data side, NOAA felt it was very important for them to be involved to determine what kind of data would be required in the ECS systems.

Okay, just summarizing quickly. What does this version 3.0 include? Note that I haven't talked about 1.0 and 1.1 and 2 and 2.1. This is an evolving process, and we are presently at 3.0.

We provide for three categories of ECS. Category 1 is for larger ships, and it has the most functionality and the toughest requirements. And we have harmonized this with the IMO ECDIS performance standard to the point that a category 1 system under this standard could be used as a back-up for ECDIS.

Without going into all the implications there, it is important to know that, if this process comes to a projected conclusion, then an ECS could actually end up being a back-up for ECDIS, and that's very useful.

Category 3 is really intended to be done at the recreational end, and category 2 is in between those two. The performance standard provides for not only the system requirements and the requirements for the display of database, it also provides test requirements.

So in this one document, we have a complete version of how you take an ECS system, look at it for the performance requirements and the data requirements, and then look at it in terms of how do you determine if it really meets all these other requirements; what tests are necessary.

For instance, in the case of ECDIS, the IMO performance standard is accompanied by an IEC test standard, and an IHO data standard. So, you have to go to at least three different places to come up with all the same information.

Time is short, and I'm not taking any questions. If there's time at the end – okay. I hope this has been useful. When this session is over, we have some manufacturers that are going to show you their systems. Hold their feet to the fire. Don't let them tell you that it's an ECDIS if you think it's not an ECDIS. Go back to the definition.

Status of Corps of Engineers IENC Initiative and Proposed Corps of Engineers Standards and Distribution

By Mr. Anthony R. Niles, U.S. Army Engineer Research and Development Center

MR. DAGGETT: The next speaker is going to be Tony Niles. He works at the Corps of Engineers Topographic Engineering Center, which is part of the Engineering Research and Development Center.

Tony and I started working on this when the Corps asked us to do these early charts. And he's continued to work with it. One of the big issues in the inland waterways is how do you get the information to put into these charts? The river is changing all the time, and how do you know where the channel is? How do you get the engineering works that are going in the channel in place and displayed?

In addition, you've got the Coast Guard to put in the buoys and gauge the navigation. One of the big struggles was that the Corps was the only one that provided an inland chart. And the only charts that were available were non-standardized. There was a wide variety of information. There was a wide variety of how old the data was, and a lot of other things.

Tony tells me now that there's a new initiative to help get up-to-date modernized data, and to keep it updated. So, I'm going to let Tony talk about that.

MR. NILES: Thank you, Larry. Indeed we have begun the initiative to produce inland electronic navigation charts for all 8,000 some miles of waterways in the U.S. It's an initiative that has just gotten underway this year thanks to Congress who has funded it. And so now we're just getting started, and the real work is just beginning.

Work not just in producing the charts and getting them out to the users, but defining exactly what these charts are and maybe even how they're going to be used. And that's a process in which we very much need to have the users as well as the electronic chart and the ECS vendors involved.

So, I'm very pleased to have a workshop here and to have all of you folks involved with it. I thank you, Fred, for the introduction to some of the terms and the activities going on at the international level. Because even though we're dealing with domestic waters here and we're not dealing with SOLAS class, a lot of it is relevant. And we're going to see why in just a moment.

Again, I was looking at what Fred was saying. We're talking about just the database, the electronic navigation chart data, and the updates that the Corps is going to produce.

The rest of this here, all the sensors, the system ENC, the computer and the display is something that is really up to the industry and the users. Or do we have some part in there in driving how some of that goes? We'll see more about that in a moment.

Fred was mentioning the ECDIS. More sophisticated, more expensive systems that are used in SOLAS class vessels. Larger ships can be as sophisticated as integrated bridge systems that can cost \$40,000.00 or more. But in our case I believe we're talking about the simpler less expensive systems that would be on something like a lap top computer that we can see in the picture up there.

So, as Larry said taking a look at the existing chart products that we have on the inland system, 22 different chart books to represent about 8,100 miles of waterways. No two are alike. Different features, different scales, different accuracies, and different update frequencies. We know that it's long been a complaint by the industry, why can't we have a consistent chart for the whole system. And so now that we're involved in this initiative, we are going to be solving that problem as well as enabling some new capabilities with automated navigation systems.

So, our objective is to produce electronic chart data and disseminate it to the public in a uniform format and structure, maintained with updates or corrections as the information becomes available, which could be several times a year rather than the five to twenty-year chart addition cycle that we use right now.

It's going to be based on S-57, which Fred did mention about exchange standards. There are some implications with that, and we'll take a look at that, closely coordinated with NOAA and the Coast Guard as appropriate. And like the NOAA ENCs, available over the Internet for free and open access.

And it's a two-part effort. As we have the inland, which is also known by some folks as the brown water area and the coastal and the Great Lakes. It's two different areas, different focuses.

Talking briefly about the coastal and the Great Lakes. These are the areas that are charted by NOAA and for which they have or will have an ENC available for the public to download. And we're not looking to duplicate those products. Rather we're looking with our information which is pretty much within the navigation channel; soundings, contours, channel limits to improve those charts or to supplement them.

So, by producing a data product in S-57 structure now, NOAA can more easily ingest and process the data. They're going to be able to exploit more of that information within the channel for their chart updates. And also putting those data products on the Internet, so that the public can download them. The user might be able to use that as what we call in many ENC, superscale information within the navigation channel with some updated bathymetric information that they can then overlay on the NOAA ENC.

But our meeting here is about the inland charts, and so it's more about those details. So, how are we going to do this? Basically this is about as centralized a project as you can get in a very decentralized organization. We have at the headquarters level the program management, overall management basic objectives, and a proponentcy for the project out of the civil works engineering construction in the civil operations division.

And then supporting headquarters through the E-chart center, which is where I am, we have a lot of the other functions involved in the management of it such as task assignments, funds dispersal, standards development, quality assurance, and coordination with outside agencies.

And then down at the division level, we have regional tasking and contracting coordination. And then, true to form for the Corps, just like most of our other projects, most of the work is being conducted at the district level. That is where the data collection occurs, the compilation, a conversion to S-57 either in-house or by contract effort.

Right now our funding looks like about \$4 million dollars a year, and we're in the first year of that. So with that, we have about a ten-year implementation plan to cover the inland waterways. The white bar is the development period for the full IENCs. That's with all the features in there with the needed accuracy.

And then the blue bar shows the re-survey, recollection of the features so that we have all the information we need at the stated accuracy. And then the red arrow shows the ongoing production of that with the updates and the new chart additions.

And then we can see with the green diamond that the initial IENCs we hope to have available for the public may not have all of the features that we want and the ultimate products in there. It may not have the accuracy we need for the final products, but there will be charts that will be available for comment and will be at least as good as the current paper charts.

So this year, as I said, we have our funding, and we're getting underway with the initiative. So, our objective this year is to produce initial chart coverage for the lower and middle Mississippi River, Ohio River, and much of the Mobile River and the Black or Tombigbee system in Alabama.

And then we can see the participants within the Corps that we have this year. I believe eleven different districts, and then some of the other agencies as well.

Our approach to development this year is we're using mostly information that we have available right now in our databases, computer-aided design and drafting information and GIS data that we have right now. A little bit of re-surveying, but mostly just in compiling what we have and converting that over to S-57.

Again, some of the features won't be in there that we'll have in the final product. And some of it may not be the needed accuracy, but we'll have the initial chart coverage by the end of the fiscal year.

The data structuring and the conversion S-57 is being done by two contractors. Mapping and GIS contractors 3001 and Photo Science. And a third one actually, Atlanta Technologies doing development on the Red River.

And we also this year are focusing on coordination with the Coast Guard for a very critical feature on the charts, and that's updated buoy information. Now, this is probably one of the most easy, yet complicated issues that we have in the whole project, buoy information. At first analysis it appears to be a very simple matter. Basically there are only three buoys on the inland rivers; Red Nun, Green Can, and Wreck Marker buoys. And all we need from the Coast Guard is the unique identifier, the buoy position, and the type of buoy that it is. Well, the only problem with that is the Coast Guard does not have a database of buoy information on the rivers like they do in the coastal areas.

In the inland waterways it's more like managing traffic cones, where they place them when and where they're needed. The number varies. And sometimes we even wonder if they're targets for traffic because they're frequently hit and pulled off-line. But coincidentally the Coast Guard now has electronic chart systems on board. They're river tenders that they're using in their river activities.

So, this year we're looking with them to modify their system so that they can collect latitude and longitude buoy type and river stage wherever they place the buoy or remove the buoy, and then transferring that information over to us where we will establish and maintain a database of the floating aids on the rivers.

And the information then goes out as updates or in the new chart additions on the Internet for users to download, and the information will be displayed. So, for the first time we'll see charts on the inland waterways that have information that's fairly recent, accurate positions on the buoys.

But keep in mind anybody who operates on the rivers knows that these buoys can change very rapidly. In some cases, the buoy may even move before the update gets out to the user. So let the user beware.

Some other features I guess that can be enigmatic to the effort that we're doing, but are important, very important to the users are top bank, line denoting flood stage. It's at this stage that we have water that begins flowing into the land areas outside the river, which can significantly alter the river currents and the navigation dynamics. So, it's information that they want to see on those IENCs.

Right now we do represent them on the paper charts for the most part, but representation of that line on a fixed scale paper chart where we can take some topographic lines and make it look correct is a very different matter than putting it in

IENCs where we have it in an electronic database and we need some accurate information to generate that line. The line is not always continuous, and the line is not always at constant elevation.

So to put that in there, we're going to need to do comprehensive bank surveys, which can be rather involved and costly; a feature that we hope to have in the out years.

AUDIENCE MEMBER: Tony, that doesn't seem like that's part of navigation. Who's driving that?

MR. NILES: Industry. And as we had -- we had a group --

AUDIENCE MEMBER: Well, protection maybe. It may be flood protection or other stuff, but it doesn't seem like it should be.

MR. NILES: Hopefully later on in the program when we have the industry speak out, they can talk about why that is an important feature. We did have a group from the industry tell us what features they deemed important for the charts.

MR. DAGGETT: I think the key is that the first line up there is significantly altering the currents and navigation back inland.

MR. NILES: Related to that as well is real-time water line. Something that as far as we know, we don't really have in any systems where there are IENCs available. As folks on the river know, the shoreline can vary significantly between low and high river stage. And again, the users have said that they would like to see the actual location of a water line whenever they're sailing a course rather than a fixed water line based on a low water reference plain. And again, just like the top bank, this is something that would involve detailed bank surveys so that we can have the multiple contours in there to enable this capability within the ECS.

So exactly what is going into these IENCs? This year we started with defining an IENC content specification, which consist of 56 features and 50 attributes in the S-57 structure that we are using as kind of our map for developing the IENCs this year. We hope to have input on that standard as we get these initial charts out and are evaluated. And it will probably be something that will be refined in the coming years.

This content specification, that was something that was based on industry input. A workshop that we had a little over a year ago, and on two pilot projects that we did last year. One on the Atchafalaya River in Louisiana and another one near here. We call it the Vicksburg pilot, 200 miles on the Mississippi River.

So, looking at the S-57 standard and how it fits in or maybe doesn't quite fit in with IENC applications, as you folks who are familiar with the standard know, S-57 was something that was written for coastal deep draft SOLAS type vessels. And there are

some parts that don't really fit well with the river system, and some of them are listed here that we found in compiling our content specifications.

It doesn't mean that these cannot be represented in our IENC database through attributes like object name and description attributes. We can still have fixed text in there that will do that. But there are features that don't quite fit, and these are ones that we might consider for modifications to the standard at least for our use in coming years.

The good news or the bad news first. The bad news on the charts is that they will be in metric as required by ENC specifications, depths and height concepts. The good news is to the users that may not be apparent as long as the ECS vendors make the conversion from the metric units to the English units, and that's what gets displayed on the screen.

There is a European and inland ECDIS standard that has been developed, and I believe is still being pursued. It's by various countries in Europe I believe led by the Germans. It's a very detailed standard with specific attributes in it, and it doesn't include just the database. It includes performance and display requirements, which is going farther than we really intended to go. However, it's something that we do want to take a look at, and look at areas where we can have something in common with that so we don't have yet another standard for the industry and the vendors to follow.

However, we're not looking to follow the standards just for the sake of compliance. We'll look at it and see what is applicable for our uses and what is not. And right now with what we're producing this year, it is strictly S-57 compliance. And the test that we want to do at the end of the year, we'd like to test out the actual suitability of the S-57 and what parts may need to be changed.

Display. This is an issue that has come up recently in discussions with Coast Guard. By virtue of following the S-57 standard, there is no graphic information within the IENCs. Specification of colors, symbols, line, weight are things that would get rendered in the SENC that's done either by the ECS on board the vessel or is done by other chart vendors, and that's fine with us.

We would just as soon leave the issue of how the chart looks up to the vendors in the industry, but there are some issues that we need to consider. I believe that Fred alluded to this in his presentation.

When we're dealing with ECDIS and ECS, we're dealing with systems in which the components aren't mutually independent. The hardware, software functions displayed in the database must all be considered for actual benefit to the vessel operator. So, that's one thing that we may want to take a look at. And also Coast Guard for carriage requirements does want to see something like the display and how the system performs. They need to refer to a standard if they were going to consider any sort of a requirement that would allow this as satisfying carriage.

In the coastal areas they defer to the hydrographic office, which is NOAA. In the inland area, that would be the Corps. So, they have said they would very much like to see us getting involved in some display issues on that.

So, where that stands right now is with river tests that we want to conduct with these charts, we hope to display the S-57 standard which is an international standard on display and is most commonly used and have industry involvement to see how suitable that is for the inland applications.

Perspective from Electronic Chart and System Vendors on Inland Charts:

Introduction by Mr. Anthony R. Niles, U.S. Army Engineer Research and Development Center

We're going to have some vendors. And first up we have a number of vendors that are going to be telling about what they have and hopefully their perspectives on what would be an effective system and relationship with the user community on the inland waterways.

And as we have these presentations being made, I'd just like to mention some items to the industry, the users of the systems that you might be thinking about and considering as you hear these presentations. Issues like cost, is there any ceiling figure, any costs beyond which it just is not feasible to have these on the vessels? Space constraints, hardware accommodations within the wheelhouse of the vessel.

Chart management. The latest charts and the updates, how do you want to be able to access those? Would each vessel access those and download those from the Corps themselves? Would that be something that a central office might do for a fleet within a company? Is that something that you might consider having a vendor managing a portfolio system and disseminate out to all the vessels?

Data transfer to the vessel. What would be the most reasonable method of that data transfer? Wireless Internet, a CD at the beginning of a trip, or periodic delivery to the vessel, data radio, other.

Also, proprietary chart subscriptions for valuated features or customized performance, might that be something that you would be interested in having?

Direct read. You want to be able to just have your system work with the Corps files, S-57 files you pull down off the Internet. Would you be willing to pay a little bit more for that capability?

How much is radar integration worth in these systems? Is it important that these eventually satisfy carriage requirements, and must the IENC look the same as the paper charts?

Offshore Systems Ltd, N. Vancouver, British Columbia, Canada

By Gwil Roberts

Good afternoon everyone. When I found out I was going to be a speaker today, and that I only had about ten minutes to talk about our company and our product, I decided to limit myself to a subject that would be very focused that will hopefully be relevant to the users and related to the working effort that the Army Corps has been doing on electronic charting in the last several months. So, I'll be talking about S-57 display updating with ECPINS.

First of all, for those of you who are not familiar with Offshore Systems, the company was established in 1977 to do some survey-type work, and that quickly doubled up into electronic chart system technology and led to the production of spectra charts as far back as in 1979.

Today the company is well known for its ECPINS product line, and I'll talk about that a little bit later. And we pride ourselves in being ECDIS, providing precision navigation solutions that meet customer requirements.

What is ECPINS? Well, first of all, ECPINS stands for Electronic Chart Precise and Integrated Navigation System. And it is basically a multi-fuel electronic chart system. And by multi-fuel, we mean that it supports numerous chart formats in a seamless fashion. Of those chart formats are HMBNB, two raster-type formats, and three vector formats being DNC, NTN, NTX and, of course, S-57.

ECPINS can integrate a wide range of centers from your GPS, your gyrocompass to anemometers and so on. And, of course, has a full suite of navigational features for route planning and monitoring.

Well, back to our subject of S-57 display. What can we say about S-57? Well, as we saw a little earlier, it's a very information rich format. And being in vector format means that the system knows every object that composes the chart whether it's a point object like a buoy, a tower, or a line object like underwater cable or control line, and areas such as land or depth areas or anchorage areas.

The level of information that's displayed can be adjusted by the user. What I'm going to do is switch to our application here and show a chart. Actually this is a chart of the Atchafalaya River, and we see some of the objects here.

And what I'll do is vary the level of information that's being displayed. So, I can pop this window here and go through different viewing groups and select the type of object I want to display. I can select soundings, for example, and I'll have soundings being displayed. This one is the chart zooming in. We now see the soundings being displayed.

The same thing I can do with textural information here to add object name. I can add, or it can go to line description. So now we have, for example, the type description and object name for certain buoys.

The other thing is, you probably saw as I was zooming in and out, the information appeared or was removed from the display. And that's again a function of vector chart that you can filter out information as required based on the viewing scale. And, of course, the idea is to reduce the clutter that is displayed.

The other thing, too, is that every object can be inter-updated. So I can go back to my chart and find information about any object. I can go to my navigation tool, and for a chart feature click on an object and have information about it, and then go now and just click on that buoy. So the system will tell me everything that's there, including the buoy. And I have the attributes that were recorded in the chart for that buoy.

I can go, for example, here and find out it's a dredged area with a dredge value of 20 feet. And the nice thing about this one is that the system will highlight in red the area or the object that's been inter-updated. And the other thing, too, is that with S-57 textural or graphical information can also be displayed.

And as it was mentioned before that's all nice, but the navigational environment is dynamic. It changes all the time. The river changes all the time. New dredging can be done. The water level can change and floating aids can be moved or removed, whatever. So, how can S-57 be of benefit in this changing environment? Well, I've identified two ways. The first one is that the depth area can be recovered based on vessel draft and underclear clearance because a vessel draft can also change, and that may change your navigational picture. What you're seeing is chart updating, which was mentioned a little bit earlier as well.

So let's talk about the first one, the safe and unsafe water definition. That is basically outlined first of all from the depth contours that are available in the chart. And the vessel draft in underclear clearance as entered by the mariner. And again I'm going to show an example here.

So, we saw that the dredge channel here was at 20 feet. If I look at what my safety depth here is, I've got 15 feet for a draft and three feet for underclear clearance. If I were to change that let's say to 19 feet, now with my underclear clearance and my draft, I'm exceeding the depth available in that dredge channel. And you see that the coloring has changed. That's because the white indicated that it was safe to navigate there. And the blue color indicated that it's unsafe.

So, as the loading of the vessel varies from voyage to voyage, the navigational picture can be adjusted accordingly. The good aspect is that all of this is done within the information contained in the ENC data set, but the limit is that the depth contours encoded in the ENC can be limited.

If we have depth contours every three feet, changing your vessel draft by a foot or two or three probably won't change the navigational picture. But if we have depth contours encoded at smaller intervals, then that becomes interesting.

The other aspect that I mentioned before was chart updating. S-57 is a nice format to support chart updating. Updates can be transmitted by Internet, floppy, or CD. Normally they're contained within reasonably sized electronic files. And those updates are easily applied by the user through normally a single click, single operator action.

And what I like about this that the chart is displayed in its updated version. I mention that because in the past we've been working with different chart formats where the updates were cumulative. So, if a buoy had been moved three or four times, well the same buoy would appear on the chart three or four times. It's not the case with S-57. Only the last modification that has been applied will be shown on the chart.

So, I unfortunately don't have an example of a chart update on the Atchafalaya River, but I do have some from another chart. So, what I'll do is show a little bit how it can be displayed on the electronic chart system. In this case, it found five updates had been applied to that one particular chart. And it gives me the issue date for each update, and the date and time at which they were applied.

Now, what I can do is go beyond that and find out for each update the changes that were incorporated. An example if I pick update number 4, it found four modifications that were done. And I can even go farther than that and say okay, I want to have information where a plotter was inserted, so I can click on it. I have all the attributes that apply to that, that plotter was inserted. Plus, the system brings me to that particular object on the chart.

And I can do that for just any update that was applied and any object that was in those updates. For example, I know that update number 2 contains a lot of changes. I think 169 of them, but I have information on all of these changes.

So as I said, each modification in each update can be reviewed by the user. So you receive an update, you don't know exactly what's changed. Because as you apply the update, the chart is automatically updated. You can go back to the history and verify each update, each modification, and those updates are sequential. The system will not let you, for example, apply update number 5 unless number 4, 3, 2, and 1 had been applied before. So, it's kind of a situation where you cannot miss an update. The system will warn you.

So in summary, we saw that S-57 is a very information rich vector format. It has lots of display flexibility, and it's very easy to update. And the only thing is it's really limited by the information encoded by the producing agency.

Transas Marine

By Larry DeGraff, Transas Marine

Just a couple minutes just to introduce myself. My name is Larry DeGraff, and I'm with Transas Marine. We are a UK based company that builds electronic charts and information systems. And if we have some time at the end, I could show you my system, but I really haven't prepared any type of presentation.

We're very active in the high seas part of the business. Currently we are probably the largest supplier by double of ECDIS systems. We were the world's first type-approved ECDIS system. And much of the functionality you will see in these presentations, of course, is driven by ECDIS performance standards. So, basically our system operates very similarly.

I look more forward to the time we're going to have later. Thank you very much for your time and the invitation to be here.

Softchart International and Pinpoint Systems Group

By Dick Davis, General Manager of Softchart International and Director of Cartography, Pinpoint Systems Group, Darnestown Maryland

My name is Dick Davis. My current position is Director of Cartography, Pinpoint Systems Group. And my other job is General Manager of Softchart International. I'm going to spend about four or five minutes just going over the corporate structure, who our parent company is, and the various companies and their locations within the group. Then I'm going to show you some logos.

As Tony mentioned, we are already on the river with two of our products, River Pro and The CAPN. Tony mentioned the Coast Guard on all their buoy cutters, not only on the river, but also on intracoastal waters. It's our software that is doing the locations, the fixed aids, and the landmarks and everything. We are currently giving it back to the Coast Guard, which is good. We never see it again.

But Tony is working a deal with the U.S. Coast Guard on it; he calls it M-O-U. And we're going to be modifying our CAPN to meet Tony's requirements. So then S-57 will be available to everybody. And it's going to be published not through the Coast Guard, but through the Corps of Engineers, for political reasons let's just say. The lawyers don't want the Coast Guard to publish anything.

I used to work for the government. I've been out of the government now for seven years. I was out of Washington. I was out of NOAA. I was out of NMA. And so I've been working with these guys.

So, what I'm covering is coming from both worlds. They both have problems. The next slide is the corporate structure. The parent company of PinPoint Systems Group is a company called Westrec Properties. Westrec Properties is to the marina industry as Marriott would be to the hotel business. It either owns or manages marinas around the world. And a lot of the facilities like the hotels, the restaurants, and everything that goes along with having a world-class marina.

We currently, under public and private partnerships, manage all the marinas for the city of Chicago, San Francisco, L.A., Long Beach, and are negotiating with the state of Hawaii; states like that. We have a lot of lakes, a brand new facility up in Las Vegas, Lake Las Vegas. We not only have the concessions for all the marinas, we actually own the landscaping business and a bunch of pizza joints, but it's a holding company. And because it's a seasonal company, it varies between 1,100 and 1,800 employees. Its headquarters is in Encino, California. And it is actually what I call the human resources department for a lot of companies, one of which is PinPoint Systems Group. In other words, all of our lawyers, attorneys, payroll, human resources, 401-K plans, it's all managed out of the parent company coming out of Westrec. I get paid by Westrec.

PinPoint Systems Group is headquartered up in Westhampton Beach, Long Island, New York. It's up in the Hamptons area. We average between 85 and 95 employees. It goes back and forth, varies, but that's a good average.

Within the group there's a company called PinPoint Integrated Systems. It is a separate LLC. And there are several divisions within that one, and it's located up on Westhampton Beach, Long Island, New York. We're in our third facility up in there.

Softchart International is a company that I'm general manager of. Likewise, it is the manufacturer of all the river charts that are currently being used on the rivers today derived from the Corps of Engineers' official data. And I try to use the best data available and supplement the private sector's data whenever possible. We had to do it probably about seven years ago. NMA actually bought some of our stuff. Guess what, there was no data, and I had just come out of NOAA. So, therefore, I devised a way, working with the Corps of Engineers, to actually create navigational chart information using data from the Corps of Engineers for the inland waterways.

And this is the data currently being used by the U.S. Coast Guard, by the tow boat industry. Whether they use The CAPN software or not, the data is usable in just about every major manufacturer software. Whether it's our stuff or anybody else's stuff, there's no format data, and we do sell the data by regions. That's located up in Westhampton Beach.

The Westrec Design Group, that's our video guys. Our guys that do the marketing for brochures and things like that. It used to be out in Encino, but we moved it because we've got a very large facility up in Westhampton Beach, and we just had more space up there than they had in Encino, California. So, we moved that group up there.

There's going to be about a four-minute movie at the end that was produced by that group, and it's going to be talking specifically about the commercial side of it, showing tow boats running up and down the river, and what we're doing. And if we've got a little bit more time, we can show the recreational side.

Tactronics is the hardware section within PinPoint Integrated Systems. We've been doing it for about the last six years, doing a lot of special custom design work for the Office of Special Operations, U.S. Navy, Navy Seals. And we've gotten into some land vehicles, HUM Vs. We're building some hardware to go on targeting for guns that shoot. In other words, we've been doing a lot of special custom hardware to pass the shake and bake test for the U.S. Navy and various groups within the Navy.

And now it's submarines. We own about half a dozen submarines with some special hardware. All that work has been coming out of the Tactronics unit. Now, we're beginning to bring that involvement into recreational and the commercial world.

American Pioneer. That's up in Westhampton Beach. It's all built and manufactured. The parts are purchased from all over the place, and we have technicians up in Westhampton Beach that do all the final assembly. American Pioneer is our sonar division, and it's up in Westhampton Beach. We have our own test tanks up there to test all the sonar equipment.

There's various application software that's located in Pittsburgh. That group is the group that's responsible for the River Pro software, which some of the tow boat industry uses as well as all the advanced application software with respect to what's going into the naval operations.

Titan Radar. That's our Paducah office. It's Titan Radar because it started out with Titan Radar aboard, but it's a lot more as you'll see in my next presentation. Tony does a lot more than just install radar boards and calibrate compasses and spin boats around in circles; things like that. We are in Paducah, Kentucky because we figure every tow boat in the world some time or another comes through Paducah.

Capt'n Enterprises, that's the title name. That's a separate LLC. It's up in Bangor, Maine. It is basically traced under the name Nautical Technologies. The CAPN is the electronic ECS system of the U.S. Coast Guard. We're on every single Coast Guard vessel. Likewise, The CAPN is just about on every single U.S. Navy vessel. Whether it's called a back-up or not, it runs, it works. It's not their naval warship. They run The CAPN also because it passed all the crash and burn tests under a set of descriptions and went through a lot of manufacturers, and that's why we use The CAPN.

Destination Direct is an aeronautical movie map display and flight planning piece of software very similar to The CAPN. And Softchart is not only in the marine business, it's in the aeronautical business. As a matter of fact, right now we are in an air cycle because come the 18th of this week is when, what, a 28-day cycle for updates for the section and terminals. It's a 56 day update cycle for the IFRs. And every 56 days every chart ever published by anything gets out of date and is totally replaced. And we go down on our knees when we go into an aerocycle because this Thursday it all will be published. Softchart will be published in CDs, and it will all be available on another product, which I'll get to in a minute, but that's our destination direct.

We have another company. It's called Capt'n Jacks/Marine distributor.com. We are what's called a brick and water company. We are the entire, or have something for the entire components of an electronic charting system, ECDIS, or whatever you want to call it. Capt'n Jacks is a wholesale catalogue house where we actually sell not only the things that we make, we sell the things that our competitors make because we don't care as long as we sell things. As a matter of fact, our Capt'n Enterprises is all mad because Capt'n Jacks sells more Novatec, or more McAfee than it does CAPN. Capt'n Jacks will sell anything the customer wants to buy. And our marine distributing company basically is a distributor that has dealers around the country that sells to dealers so they can compete with Capt'n Jacks. So, we don't care who sells our stuff. But we sell to dealers through marine distributing, but it all comes out of Capt'n Jacks. I might want to mention Capt'n Enterprises is also a distributor. He's got three dealers. One is a catalogue house that competes with Capt'n Jacks. He didn't want to do business with himself. So, Capt'n Enterprises sells to one of Capt'n Jacks' competitors with respect to being a catalogue. But we don't care as long as they sell stuff.

And IMAS. IMAS is our latest thing that I'm quite proud of. It's Internet, marine, and aviation services. It is web based, and I've got brochures for all of this I'm going to put up on the table here at the end. IMAS is Internet marine. That's how you do all your updating policies and maintain the database.

These are some of the logos of all those things that I just talked about. They've got position sensors. They've got hardware, software, and data, okay. And the Corps of Engineers does data.

Position sensor, hardware, software data that we talked about here customer fulfillment, the marketing, your sales, your distribution, the guy that does the installation, the technical support, the guys that are on the phone 24 hours a day. The guys that do the training. The guy that actually puts those first four components and actually sells it to the customer, the end user. The end user is the one that buys it. These are all components of the system. And here again if I'm giving my presentation at NOAA, or the Corps of Engineers, they are going to say it's the data. I know some of the answers, but I'm going to ask this, guys. The most important part of an electronic charting system whether it's an ECDIS or a little handheld plotter or anything else is the customer, the end user.

The second most important part of the system is how do you get it into the end user's hand, the installer, the distributor, the trainer, the guy that's actually going to actually make the sale, the purchase, the commitment, and everything else. The rest are just parts, pieces of the system. And the system is only as strong as its weakest component. And I just wanted to stress that. I'll take questions at the end.

ICAN Ltd, Newfoundland, Canada

By Mr. Patrick Brunet

My name is Patrick Brunet. I'm with ICAN, a Canadian company based out of St. John's Newfoundland. I'm from the Cadet City Office. I'll start with giving you an overview on the company, and I'll switch to software every now and then to show you what we're doing. ICAN is a software development and system integration company. We're a young team. The average age is around 35 years old. We have a team, as most of the company is marketing, engineering, software development, technical service.

We do sophisticated navigation and communication software. Communications are based on AIS facility. And we do GPS, DGPS infrastructure, as well as AIS infrastructure. And within the AIS infrastructure for the Canadian Coast Guard on the St. Lawrence River, the same thing for Halifax Harbor, Placentia Bay. We did the engineering for that, based on their requirements for those situations or locations. We do have a consulting service to design systems with Coast Guard as well as protecting nations in some of the Asian countries where we work.

Real-time navigation and information system. That's based on the charting system as well as on port maintenance and water level maintenance. We do have software data on S-57 data that is able to implement real-time water level information based on wireless link. If it's on the vessel, the message could be sent over the AIS link. Or if it's ashore, through the network with information for the water level monitoring.

That's actually being used by the Port of Montreal, which is monitoring water levels along their waters as well as downstream where they do have depth of friction for vessels that are able to come alongside. But if the water level is not high enough on the river, they would not be able to go through some of the sections of the river there. We have our very good expertise in communication and navigation systems.

We have a team that is from the marine industry. I'm a navigation officer from the commercial side of this, not with the Coast Guard, but with the Merchant Marine. We have people that are from the Coast Guard, and we have engineers that have worked with the Coast Guard before.

Our products are based on open architecture. All of our products are based on the Windows operating system, mainly NT-4, 2000, and now XP. We've never played with '98 or NE. We have kept away from the unstable platform.

We have a flexible and dynamic system. If a customer needs customization, we're able to do it either by developing more software, or reconfiguring our software. You can configure whatever you want in software as an info panel.

We have two main softwares that are targeted to the Merchant Marine or Coast Guard or other agencies. One is Regulus, which is a system which reads only one format of chart at a time. It could be either raster or vector format, depending on your needs. But when you buy it, it reads only one format of chart.

We have another product which is called Aldebaran which is also an NCS, which reads multiple formats of charts which are vector, raster, as well as point data, plus depth, which we could implement right in the software as well.

We have another line of product which is targeted to the fishing industry which is called FINS, Fishing Information and Navigation System. It does all the fishing maintenance for the gear as well as the catch. Here you see our two main logos for Regulus and Aldebaran. Those are two navigation stars that are used in celestial navigation. That's where the name comes from.

Our ECS are designed for professional marinas. They're based on the IEC-94461974 standard as well as on the IMO. And they're based on the IMO current standard as well. We are not type-approved, and I'll tell you that. We have found that it could be a problem for lots of our customers if it was a type-approved system because lots of the functional capabilities that we provide could not be type-approved because they go against some part of the standard. So, that's one of the reasons why we're not type-approved.

Systems are easy to use. Anybody that has already used a computer will find it easy because it's Windows based. And someone that has never used a computer will be able to use it just on turning it on. And it will follow under the chart and open all the charts necessary for the voyage that are planned or even not planned. It's just based on the ship's position.

They are highly stable and don't crash as many computers do. We won't claim that it never happens. That's for sure. Most of the time we use off-the-shelf hardware. We try not to build a system with hardware dependent components.

So if you want that type of display, we can find it, or we do already provide it to some of our customers; brightness, waterproof, or anything you need. Most of those technologies are already available off the shelf. So, we're not re-inventing anything here.

Our features are highly configured as I was saying like the info panels, auto chart loading, route planning, data import/export to current market database or even to ECDIS. So, if you want to enter a list of way of point or route through an excel sheet, you can do that and import that to the software. So, it can be done ashore by someone else. It can be exported to another vessel if you're doing the same route in one company.

So, those are things that could be done. We can get the ARPA targets on the screen as well as radar info, AIS info. We have worked closely for the past four years to develop our AIS interface. And we're able to implement all the message, and we're actually up to the requirements of IMO for AIS display. We are at a minimum keyboard and display, but we do meet all the same requirements that the minimum keyboard meets, which is just a small display of four lines which can do all the messaging and all the things. You can do all the same messaging with the software and the keyboard of the computer, which is a lot easier than using a ten-digit key pad.

Part of our planned products, we are looking at ECDIS. Not in the near future, but our systems are quite close to compliance. So if we need to get there, or we have sales that need to be of a type-approved, we could get to the type-approved level sooner than is actually planned. We're looking at other data products, data formats to implement there which are VPS or DNC.

That's how a system can look actually. You have the main system here, which could be on the wheelhouse. You could have remote, which are just display, keyboard, and mouse. And you can also have over a network another station on the vessel which could be in the captain's cabin or in the ship's office.

So, from that system you could build your route, do all illuminations and send it to the main unit where it could be used up on the bridge. Those are the sensors that we actually implement in the system, the archives, special lock, meter sounder, track point positioning, GPS, LORAN if needed, AIS which is a fully implemented two-way thing.

So, we can upload to the AIS transponder and get all the information from the AIS transponder. the DGPS, the auto pilots, and the fishing industry. We also hook to the gear finder which helps them find their net fill water. They know exactly where their trawl is in the water, referring to the vessel, length of the line and distance, depth, and angles from the vessel.

We do have a lot of different modules that could be applied depending on your needs. We do have the navigation module, which is really used by going out to position all their navigation aids. They have a database of their navigation aids, which is a digital database. We import that into the software, and we give them a target where to place the buoy in the water.

We have a survey module, which will do all your tracks needed for the survey, depending on how you build them, with the heading and then the spacing of all those tracks. Mobile access tracking is the same as AIS, but over a satellite link. So if the vessel goes at sea out of range of AIS shore station, it could still be tracked.

Radar overlay NIS are the two other models that we have. That's the navi model. That's the vessel. That the drop point of the vessel, which is the large circle there, and there's the smaller circle which is the buoy advertised position.

So they get all the information from their speed and the name of the navi, the bearing and the distance to where the buoy is to be placed. And the actual green bar there is green because the buoy is in the right position. If it was in the wrong position, it would be red. And it turns yellow if it's in an exit table radius.

Survey model. That's one of the format of chart display that's moved to being raster data. That's a reference tip. So any geo reference tip could be displayed into the software. Mobile access. That's what we use as satellite communications for long range AIS. That's a radar overlay. That's the coast of Newfoundland here. And we could have only the radar on the screen, or we could have that with the chart information as a real overlay.

That's the AIS, the network is working. You've got mobile station, and you've got shore station that could relate information to a VTS or even to the owner of the vessel if the VTS gave access to any of the information over the Internet. That's actually what the seaway is planning to do on the Great Lakes.

And those are AIS targets. That's the Halifax Harbor. That's a real-time image that is there. It's not a simulation. There are lots of vessels that are using AIS transponders in that region. Pilots carry aboard units. So, they bring units with them with transponder on board the vessel in the Halifax Harbor now.

The FINS is still under development for some 3D stuff, but the basic software is done. We're still under development with Saab because the final type-approval is not yet rubber stamped. So, there may still be some minor changes to be implemented in the software. We're trying to implement C-map chart format in the software. We're working on some other tracking modules with a different satellite company. Radar overlay where it's actually improving to a new version of radar hardware.

Real-time water level. We're still working on that for the moving unit, the ones that are using it on the water, because if you're in a section where there are multiple water level meters, it may be a curve or a straight line in between two of those stations. So, we're working to make some interpretation that is more accurate than just a straight line in between those two stations.

And enhanced AIS capability to be able within a fleet or within some vessel to send more information or receive more information. That's what the software looks like. I have actually overlaid S-57 data with note data. That's the Halifax Harbor in Canada. I could easily turn one off and keep the other one up on the screen. So that's S-57 data as you've seen with the Oasis software. We can remove any object or select what we want to display or not display. We could as well change the look of the chart depending on the depth that I want to implement there. So, if I put the deep water at 50 meters, it's going to change what the chart looks like. You've seen that there is some light blue that has come right here in between the 20 meter contour line and the 50 meter contour line, and that the harbor is not 50 meters deep.

And as well we do display simultaneously multiple formats of charts, so I have a raster date -- raster chart right there as well as S-57 data down below here. So we can seamlessly display what's available. So, if you're sailing in an area where there is S-57, you could choose to have S-57 loaded. Or if you rather sail on a raster one, you could load raster. It's up to the user.

And if you're going where there's only raster when there is S-57, it will reopen S-57 if that's what you have selected as your first type of chart that you want to have there. So if there are any questions, I'll be available at the end.

Navionics S.P.A., Viareggio, Italy,

By Mr. Robert Moshiri, Navionics

Good afternoon everybody. I'll try and keep it short and simple. I know everybody is trying to go for a break. We've all been here for a while. I've prepared a very brief introduction to our company. In addition, I have some charts with me on a PC. If anybody is interested to take a look at some of the charts, just come over during the break or after the session, and I'll be more than happy to show them to you. I'm also staying at the Vicksburg Inn in case anybody wants to discuss any matters further.

This is basically what I want to cover very quickly. The company, introduction, the group, the product line, offshore and inland. Navionics was founded in 1983, so it's almost twenty years old, and it's still managed and run by the original founder. We actually produced the first commercially available electronic chart, and the company also manufactures GPS units. We don't just make electronic charts, we also make plotters.

As far as the U.S. market is concerned, we only market the electronic charts here. But in the rest of the world, we do sell plotters as well. We have well over 13,000 charts and port plans digitalized from paper charts and some from electronic charts.

Our research and development capabilities are in three locations in Wareham, Massachusetts, where I'm based, in Italy and in India. And in addition to that, we have various sales and marketing offices around Europe, the U.S., and in Asia.

The product line can be divided into three. And again I'm talking about the electronic charts at this point, not the plotters themselves. One is the ECDIS market. We are working with the German company 7Cs, and are currently developing this product. And then there is the PC market. The PC market has the advantage that you can provide a lot more information on a CD and make it available to the user. The downside is obviously that you've got to have a PC on board. It's not a problem with large ships, barges or yachts, but it is a problem as you go down the scale.

That's why a big part of the market is the chart plotter market, and our market there is divided into offshore and inland. For the Offshore market, we use mainly NOAA charts or the NMA charts as well as some private sources, but for the inland we use primarily private companies. The slide shows part of the Mississippi River made from NOAA charts at 16 nautical miles. Obviously as you go closer and closer, that's four nautical miles, you see more spot soundings bathymetric lines. This is the one nautical mile slide.

This actually goes down to one-eighth of a nautical mile. So, you get a lot more detail. And we spent a lot of time and effort in making the screens very clear so if somebody is navigating at a certain zoom level, we just give them the necessary information which makes it a safer for them when compared with a cluttered screen. Obviously there are advantages with vectorized data as other speakers have described. You can turn certain layers on and off.

This is what we call the HotMaps. They're basically electronic maps of many lakes in the U.S. We don't cover the waterways as yet. And the source for these maps is all private, and it's mainly for the recreational boat markets, but it can be easily expanded to cover the waterways too.

These are their advantages: The product is seamless. So if five, ten, fifty charts are used, the user doesn't have to jump when he goes from one chart to the other, nor a change in the scale occurs. They're made so that you can float from one to the other without missing out on data. Also, the most detailed data is used in every chart, and it's integrated within that. Being vectorized, you have a lot more flexibility with the displays, et cetera as some of the previous speakers have shown and you make a lot more efficient use of the memory space, whereas raster uses a lot more memory.

The cost benefit for the consumer has been that in the recent past, the price of electronics has come down. And the memory capacity has gone up. So, currently we can offer several times the area and many times more the detail for a lot less than what the customer was paying for. So, we are making the product available to a much greater audience. And that's a big advantage. That means that more people have access to plotters and more people have access to charting, making it safer for them to navigate.

The limitations of the inland market, the way we look at it at the moment is the fact that our own coverage is not complete, because the private data sources that we use are not complete. There is a bit of a hodge podge in coverage. They cover certain parts of the country and not all. Some sources are very regional. They're very good in one region, but they have absolutely nothing or very poor data elsewhere.

The quality from private sources is also not consistent, let alone when you have multiple sources. And that means the scales are different from one chart to the other as well as the information. One chart gives you the Bathymetric information in feet, while

the other in meters. One goes from one to two and five meters, while another has five, ten, and twenty bathys.

And the cost factor obviously plays an important role. Since having to purchase these or pay royalties for them, the cost of the end product goes up, and it makes it accessible to a lesser audience. And our purpose is to actually reach as many boaters as possible.

Multiple data sources obviously means different contracts, different deadlines, different priorities, and that's not desirable either. And that's about it. The last part is just an ego trip showing my name and title. Again if you have any questions, I'm available. Thank you.

Electronic Navigation Workshop Discussion: Response from the Towing Industry

MR. DAGGETT: I want to thank all the speakers and the vendors here. Workshops can be several different things. Sometimes it's just a bunch of presentations. But in this case, we wanted this workshop to have some interaction. So we thought we'd start with some presentations, and then end it with some interactions and a summary.

So, we're at a point now that we're basically through with the presentations, unless we get through with the discussions and have a little bit more time and some of the vendors want to come up and talk a little bit more. And I know it was really tough, and I'm pleased that they all accepted and came here, knowing that they were being limited to ten minutes. That's really tough to put a vendor in that position. So, I really do appreciate it. I thank everybody for their cooperation.

I'd like to turn this back over to Tony and let him conduct the discussion part and see what kind of reaction and feedback we have to what's been said so far. Tony.

MR. NILES: Okay, welcome back. And now we get into the things that have not been said. And we do have the very critical segment, the users. We have Shelby and Bruce who are here. But anybody involved with industry, the towing industry either directly or indirectly who is very familiar with issues in that area, please go ahead and introduce yourselves. I know Shelby.

MR. HOUSE: I'm Shelby House with American Commercial Barge Lines. Currently we have operations in North and South America, Venezuela, Argentina, Puerto Rico, Paraguay, Brazil, as well as the United States. And I've worked with electronic charting systems for four years at least. I can see a few issues I'd like to talk about here shortly. Thank you.

MR. NILES: Thank you, Shelby. Bruce, welcome back. Introduce yourself, please. Let us know which company you are with.

MR. HASSELL: I'm Bruce Hassell. I'm a Port Captain with America River Transportation Company out of St. Louis. We operate thirty tow boats, and we have the PinPoint System on board. I'm really interested in the new digital charting.

MR. NILES: Thank you. Who else from the industry? We have two representatives.

MR. WILLIAMS: Hi, I'm Clay Williams. I'm from Market Transportation, and we also operate on the Mississippi River. We've got 27 boats that run from New Orleans to St. Paul. And like Bruce, I'm very interested in the digital charting.

MR. GECK: I'm Tony Geck with Artco. I work with Bruce. I'm the IT Manager. I'm here from a technical standpoint because I have to maintain these navigation systems long term.

MR. LINGER: Yes, I'm Rodney Linger, and I'm an Engineer with Louis Brothers. We're out of Columbia, Illinois, and we operate on the inland waterways from the Great Lakes to the Gulf and now down to Florida.

MR. NILES: Others? One more, we have Ken Wells from the American Waterway Operators. Ken, if you'd like to introduce yourself. And, Ken, I'm going to go ahead and throw out a subject that maybe you could speak about, and that's AIS on the inland waterways.

MR. WELLS: Gee, thanks. I'm Ken Wells of American Waterway Operators. We are the national trade association for the towing, towboat and barge industry. On the subject of AIS, it's been something that for about eight years now has been my responsibility. And through that, it sort of warped into some responsibility for our position on electronic charting.

Tony had asked me to make a couple of comments. I apologize because they're going to be somewhat confused and disorganized. Part of that is because I was not prepared to speak, but most of it is because the entire subject at this moment is confused and disorganized.

So, what I can give you are some observations. The Coast Guard is in the process internally of writing a notice of proposed rule making, which the commandant has told them they will have out this summer, with a final rule predicted for the end of this year if they can meet that deadline which would set the rules for AIS carriage requirements in the United States.

At the same time Congress is debating a port security bill, which would require AIS. The Senate bill didn't have anything in it. The House does have something in it. The House bill, which is probably going to go to a full house next week, would require AIS in VTS ports by the end of this year on tow boats pushing tank barge vessels by next year, midyear, and on all inland waterways by 2004.

Can the industry meet those deadlines? No. Can the manufacturers provide enough units? I see a couple of heads shaking. I won't put you on the spot to say that publicly because I'm afraid you'd say yes. But my guess is that the industry cannot provide the units by then. So, we have a problem on our hands.

One is if we are sincere about AIS, we need to come up with some realistic deadlines. Probably VTS ports by 2004, maybe putting the entire Gulf coast is a realistic deadline, at least a starting place to talk about.

The second problem now is cost, and that will probably be coming up a little later. But as we talk about costs, you as software and hardware manufacturers need to be aware that in the industry's eyes AIS, electronic charts, are metamorphosing into the same beast. And so your efforts to provide a product at a reasonable cost are going to be tied up with the AIS manufacturers' desires to make an absolute killing. And I'm not going to accuse anybody of trying to push up the price of electronic charts. We have been telling people based on what we have heard from industry that \$8,000.00 is a good starting point for discussion. Some of that comes from breaking down the pieces of it. A PC is a couple of thousand dollars. A digital radio is one to five, but let's say three. And the rest of it is basically software, from what I can gather.

I've heard a figure for the St. Lawrence Seaway that they are providing AIS for their units for -- and jump in and correct me if I'm wrong because I heard this yesterday-- \$24,000 to \$26,000.00 a year. I work for a trade association. I can't float that number by our members without this thing being dead. \$24,000 to \$26,000.00 will kill it. \$15,000.00 will kill it. Eight is what the industry has been expecting. It's probably a little more realistic.

So, it's going to be incumbent upon us as operators to make sure this is as strict of a standard as we possibly can make it and still be a safety security tool, which means a lot of the bells and whistles that are talked about at the international level are not going to survive.

Now, I'm going to contradict what I just said. There is enough concern over stressing the guy in the wheelhouse that the company that can come up with the best working radar PCS overlay probably wins. They do not want to look left, look right, out the window to look at basically the same information.

The final thing I want to leave with you is that the National Academy of Sciences had a meeting in New Orleans two weeks ago on AIS. NAS is studying AIS. We heard two days of presentations by AIS experts and other human factor experts. And I was sitting there on behalf of an industry that brings 4,500 to 5,000 vessels to the table, combined passenger vessels with our vessels, inland passenger vessels are up to 6,000 or so. Add all the pilot carry-on units, and I bet that's another 1,000. The domestic market, in other words. It bothered me that in two days I didn't really hear anybody except for Mark Stevens talk about PCS inland operations.

This is going to go to a one-man wheelhouse. It's going to go to the guy who does not want to spend a lot of time going through fields on his computer, updating anything, even doing more than glancing at it in passing, and that's the market. And based on costs and based on the complete focus, and what we're seeing on the international community, I'm afraid you're going to see this industry digging its heels and saying if you want this market, come to us with a product that's built for this market.

And I know that a lot of you are light years ahead of this. You already know this. And you're working on a PCS level to do that. But again your future is now intertwined with AIS, and it's going to be seen as one-and-the-same product before very long.

I guess I would say that some of the deadlines we're seeing and some of the costs make this thing a nonstarter. So we need to get over those humps to make sure that this project has a life. And I won't say that it's dead; it's not. You know that it's a good product. You know that it's a good safety tool, but getting over a couple of these humps is very difficult, and that's my story. Thank you.

MR. NILES: Thank you, Ken. Well, we have the government chart producer. We have the regulatory authority. We have the electronic chart and the ECS vendors, and we have the users here. So, let's go ahead and let the dialogue begin. Questions? Larry, I'll give you back your four minutes.

MR. DEGRAFF: Over the last couple of years, I've been riding boats up and down the river working with one of my customers that operates a fleet of boats. And it's become very apparent that to produce what the operator of these vessels needs is not to create a product based on a previous product.

The point that Ken made was very good. There are two issues. The way chart data is used by the user in the rivers is totally different than the way data is used by the blue water sailor. My background basically is a blue water sailor. And having the opportunity to ride with pilots and talk to them about the way they use the data, it's clear to me that the data structure is going to have to be constructed, although not necessarily in a different format, but differently than we would normally construct a navigation chart for a ship.

A lot of us vendors have been kind of talking on the side. And it appears to me that we're all pretty much on the same page, that we all realize that the charts and data that are coming out for the rivers is going to be different than the charts that are coming out of NOAA. And then we have to develop a special system that the tow boat operator can use that gives him the ability to access the information that he needs from the river chart and do it in a very quick, very fast method.

One of the things that I've seen is that the operators rarely have their hands free. You know, they're running multiple rudders, and they must be able to access the information from the chart quickly. He can't go through several levels of menu to get the information that he needs. He needs it. He needs it fast. And that means that we really have to develop a special application software set.

Now, Dick earlier presented his solution, which is a special river package software that deals specifically with the river needs. Transas will be developing a similar type of software to address these issues. But we need from the Corps and from the Coast Guard and from the data people a format that we can begin to work with.

In other words, we need to get a clear definition of how we're going to structure that data, what data is important to the mariner in the river, not to the blue water mariner, but what data is important in the river, and then how, once you define the file, we can then build the object presentation libraries. Presentation libraries are relatively easy to do compared to the actual Corps data.

So, if we can define what the needs of each operator are, like how many contour lines do you need to have, what should the distance be before you re-draw banks of the river, for example? How do you deal with the presentation of a revetment? That's the stuff that we can do, but you guys have to put all that information in a file that we can access. And that's what we're looking for.

If we have those things, we can build a product. We're getting closer; all of us are getting closer to meeting the needs. I have some new software where all the menus disappear. And basically the only thing the guy looks at is the chart. If he takes his hand off, and he moves his mouse, and he clicks on an object, he'll get information on the object. It pops up on the screen. A lot of these towboats operate with small pilot houses. They can't use large displays. That means that you've got to make the buttons a little bigger so that the guy can hit it with the mouse. There are a lot of issues. We can do all of these things, but we need the fuel. Thanks.

MR. NILES: Larry, let me ask you one other question before you quit. Concerning the data, would you recommend that we strictly follow ENC specifications? I know that that would make it easier for you folks to read the data. But like you just pointed out, there are differences, so there are trade offs.

MR. DEGRAFF: I believe that we are going to have to modify the S-57 ENC data structure. Earlier this week I talked with a fellow that I worked with who's going to Europe. And he's taking a list of things to Europe for an internal discussion relating to the German river requirements. And we're going to be looking at or basically doing the same thing that you in your presentation said that you were going to be doing. And that is, we're going to look at what the customers in Europe have asked us for to see if it's compatible with the river information here.

To tell you the truth, I think it's going to be significantly different. I think their requirements are going to be not nearly as wide ranging as our requirements are. You know, what we do to control water flow in our waters compared to let's say, for example, the Rhine River, that it's light years different. And so I don't really think that we're going to be able to come up with much compatibility between the European requirements and the U.S. requirements.

And I actually believe that the U.S. requirements are going to be more detailed. And if that is the case, then maybe we should be inviting what the Europeans do. Because if their requirements are less, we can incorporate them in what we're doing here.

MR. NILES: The only problem is they have a big jump on us.

MR. DEGRAFF: Yes, but I don't believe there's a solution yet.

MR. NILES: Thank you.

MR. DAVIS: Dick Davis here again. First of all, I want to address the ENC. As Fred defined an ENC, an ENC has to be produced or authorize someone else to be produced by a hydrographic office. The Corps of Engineers is not a hydrographic office even though it's got the best available data for harbors on the coast for the inland waters. Their data doesn't qualify as an ENC because it's not a hydrographic office.

And Tony has dubbed his terminology, what he's going to be producing is IENC. IENC data does not qualify for an ECDIS, so we should forget this whole term ECDIS. We're talking ENC. And along with some of these other standard working groups, what's going to be required here in the United States for coastal navigation which includes tow boats is Class II ECS Specifications coming out of RTCM and 109.

Likewise 109 is being beefed up to qualify as a back-up for ECDIS as a Type I, but you guys will be Type II. And it will allow private sector produced databases, but we will be producing our databases derived from the official authority. Now in this particular case, Tony is and the Corps of Engineers is an official authority, but it's not a hydrographic office. So, it doesn't qualify for an ECDIS, but it does suffice for ECS and is the best available data. You know, I just wanted to mention that one.

Now, there's one other thing that I wanted to mention. I mentioned this to M. K., and I addressed this issue at St. Louis. That was a couple of weeks ago. Your budget is \$4 million dollars over ten years, and you've got about one-fourth the money you need to accomplish this. Now, the guys that used to work for me are now producing the S-57 data for NOAA right now. And they're light years behind where they really want to be at this time because of the nature of the beast of doing pure S-57 ENC specifications. It just costs too much even for a hydrographic office. And believe me I've been around the world. I've seen hydrographic offices. Tony has a hydrographic office because you are really, even though you're not quote a hydrographic office according to the IMO.

We have NOAA, NMA, and the Corps of Engineers. And I'm even going to throw in the U.S. Coast Guard, which falls under the Department of Transportation because they do the navigation, text and floating aids, and it's very critical. These are the things that are important on the river. And here again, too, your first couple of years you're basically going to be producing exactly what I'm reproducing right now anyway. It's the existing chart books.

And there are two types of accuracy, informational accuracy and horizontal positional accuracy. And I'm giving back to all the drivers right now exactly what you guys are publishing. And a guy, a towboat driver called me up; they were running up the Cumberland River. And he said, "I'm up in a corn field." And they wanted me to fix the chart. I said, "No, that's the Corps of Engineer's chart. I'm not going to change it." I

said, "Are you safe to pass the track?" They said, "Absolutely." I said, "Come back the same way. Go up on that corn field because that's where the river is." And that's coming from the Corps of Engineers' chart book. You follow me?

And that's what's critical. And they blame the chart producers. I know Transas makes data. C-map makes data. The customer is the most important part of the system. It does not come back to the government. It comes back to the guy who supplies the charts, and they're his charts. They're not the government's chart even though I'm just reproducing in a derived format government data, but the government data is wrong.

So, what I'm going to make a proposal and a suggestion. Unless you know somebody that could get you more money, why don't you change your goals, because you'll never finish it. And the more data you collect, the more you're going to have to maintain. I brought this up in St. Louis.

Why don't you try to modify IENC collection working with the U.S. Coast Guard as a hybrid raster and vector. Those things that you know that are critical and high up on the list like the range lines, the floating aids, the fixed aids; those things that under the MOU of the U.S. Coast Guard provide you. Get those and make them available. And then at the same time focus on the existing chart books, for example, the upper Ohio, the Tennessee, the Allegheny, the Arkansas has got some good stuff up there, but I haven't seen it from the guy out of Louisville.

I want to say this again, data manufacturers make most of their money not from the commercial guy, but from the recreational industry. The recreational industry here on the inland waters is really picking up. And at Ten Tom it's very popular. And that area needs to be re-surveyed and re-compiled.

And you may get some support out of Congress, I mean here again just that great association has 2,500 members, and they use that religiously. Believe it or not, I was basically able to put the Ten Tom pretty good. Some of it is all right. I used tricks to put these things that are uncontrolled by you on your surface and, using standards 90 percent of the time I'm okay, but there are those things that just don't make sense.

What I'm going to suggest is an overlay process. Get the upper Ohio guys, get the guys coming out of Huntington and Pittsburgh, and hurry up and get a good up-to-date paper chart in raster, take the aids off, make the aids available. And make the chart books look alike. I like the way the guys out of Louisville do it because it looks more like a coastal chart; Tennessee, Cumberland.

If you can get that all to look alike while you're making the paper charts, take the aids off, make all the aids of navigation available, virtual aids make them available upon the Internet, you suck them down, you put them on there, you can update them, you know, and it gets you there.

Spend your money wisely to provide the best product as cheap as you can as fast as you can. Get that resurvey work done, and then build from that. Think of the paper chart, think of the aids. And as you're doing that, then build this total vector set because vector does have its benefits over raster.

Now as every towboat driver, every towboat company here and every decent electronic chart manufacturer of software, these guys create their own vector, their own alarm zones, their own everything that's built into their own system. They save it and then use it.

So, the government, I know if they need vector to do what they have to do, they make it themselves right within the ECS system, and they save it. But it's just something to think about, you know. I can talk more with you afterwards, but maximize the dollars, the U.S. taxpayers' money to get the biggest bang for your buck and say to the navigation maybe don't use this ten-year plan that you have, and modify it a little. That's all because you don't have enough money.

MR. NILES: Well, Dick, thanks. As far as the funding goes, the length of development is basically to fit the funding. Right now we believe that we're going to be at about \$4 million dollars a year, give or take a little bit.

So, with the task that we have ahead, that will be over about a ten-year period. If Congress sees fit to give more, then of course that process would be accelerated. As far as bang for the buck and products we should be doing, we are doing that right now. We did not commit to make a new paper chart to the National Transportation Safety Board after the Amtrack derailment. We committed to fostering electronic chart technology. A new chart book isn't going to do that.

As we have heard from these guys and others from the industry, they're not looking for a new chart book. They'd like to see an updated one, but they also want to be able to use the electronic chart technology. Keep in mind at the end of this year, we're talking about initial vector chart coverage for over 70 percent of all the tonnage on the inland waterways. Now, that's pretty good bang for the buck.

Now, we still have some work to do on the whole system. And you saw how long it's going to take, but the products that we're going to have out are going to be at least as good and in most cases better than what we have right now on the paper charts. But thank you for your support.

MR. HOUSE: I only have a few comments. This is Shelby House. I have a few comments. Some of these are addressed to everyone, some mostly to the charting vendors. Some of these have already been made. Maybe I'll say it in a different way. All we're really talking about is the base data. And I think, you know, Dick, kind of hit on this a few minutes ago in his comments.

When we have an electronic charting system, we start with a base set of data or base chart, but there are quite a lot of things that we do and things that we need to do with the charting system after, that are actually overlaid on the base data, even some things that do not necessarily have to do with navigation. A lot of the demonstrations I have seen show nothing about annotating the charts. That's a very important feature. You know, that would cover a lot of ground.

Also, I did not hear a lot about support for these systems. And that's something that I think we all need to plan on. This cannot be a nightmare to support it and maintain on board the vessels. I hope everyone understands the nature of how these systems will be used. We're going to tear it up. We're going to sit on the keyboard. We all have fat fingers. We're half blind. When you put us in front of a computer screen, we're going to find all of the system files and rearrange them, delete them and spill coffee in the keyboard and so on. We'll have crumbs all over everything. It's going to be a pretty tough environment.

That's how it's been with computers in general on board the boats. This is what we're finding. It's a dirty environment. There's a lot of vibration. It's going to break. And especially software-wise, build in something that is easy to repair, and is easy to troubleshoot. At least you know what's going on. You can isolate it between hardware and software; that kind of thing. I guess I'm kind of skipping around here, also.

Another thing I would like to touch on is that most of the charting systems I've seen are blue water oriented. And we're talking about coming inland and specifically to the Mississippi River system. I'm not an expert on the S-57 by any means, there's a whole lot I don't know about it, but I don't see a way around making some kind of a super set of the S-57 standards.

There's a lot more of a vertical component. You're not dealing at just sea level anymore. You're going to have several vertical tables. I think Larry touched on, what does the vertical resolution need to be. I would suggest one foot. That is twenty years down the road. I know Tony is about to choke.

And that's not necessarily derived from the two RMOs, the GPS, and that kind of thing. This is going to come from river stages and so on. And, like I say, you've got to keep it simple to get something started. And down the road we'll probably get there, but I think that's what we're talking about. I just wanted to state what I think the goal ought to be. You know, we're talking about one big giant docking chart, for lack of a better term.

Training is another issue. Documentation, help files, that's going to be important. A lot of these guys haven't worked with computers before. Keep that in mind. It's going to make a difference to whether this lives or not.

MR. DAGGETT: How can this be integrated into some of your training that you're doing now? Is there a place to integrate some of this?

MR. HOUSE: Sure. And we have done that. I've had a group of South American pilots up there, and it works pretty well. And that could be developed further. However, keep in mind that some of the best training grounds or the best training environment is on the river while you're underway. This could be done say with, besides help files or context sensitive help, training videos, specific exercises; that kind of thing. There's a lot that could be done that way. That's mostly it.

The other thing is frequency of the updates and the data. I'm not sure if there's really a standard or a de facto standard for a time period on updating the charts. But if it's anything less than about one day, we're likely to need some facility to make our own updates to these charts whether it's our own survey equipment that's integrated within a system for real-time updates or what have you. There's going to have to be some kind of facility.

I don't see how the government agencies are going to be able to provide this kind of real-time data. And I think it's going to take a lot of work, and this is the work ahead of us between the government agencies and industry to define exactly which data needs to be updated in real-time as well as what could be left to say a quarterly, monthly, or some other period. That's still kind of ahead of us, but that is going to be an issue. And keep that in mind.

So far and I haven't looked at some of the other systems in detail yet, please keep in mind when we talk about these symbol libraries or the display libraries for some of the aids in navigation, we have our own stuff maybe that come inland on the western rivers, and most of these are not in the set that I've seen so far.

Hopefully maybe RTCM can define a standard set as far as the U.S. Coast Guard Volume V. There are two colored plates in there. And there's a set for intracoastal that I know of and also for the western rivers, and these symbols need to be included. You know, a lot of systems are compatible internationally, but you get a little bit different as you come inland, you know, intracoastal and the western rivers. Those symbols need to be included. Thank you for your attention. That's all I have.

MR. MYLES: I'm M. K. Myles from regional headquarters. Could you expand on -- you did mention intracoastal and up the Mississippi.

MR. HOUSE: Right.

MR. MYLES: Could you break some of those comments down between those two? Are they exactly the same from New Orleans over to Galveston, or from New Orleans up? Is it two different situations from your perspective?

MR. HOUSE: As far as the symbol library or --

MR. MYLES: Any of the things that you mentioned. You mentioned document charts, frequency of updates, users adding their own survey data, symbol sets; all those things.

MR. HOUSE: I'm not sure that frequency would be as much of an issue on intracoastal, as it would be on the Mississippi or western rivers. Intracoastal I would think is going to have a lot more to do with, for example, your sea level and your tides. That's not going to change like levels and flows on the Mississippi.

For one thing, one noticeable change on the Mississippi is that you might have a rise in one location, and a fall in another location, and it might be falling above there. And so you have a rise that's actually coming down the river. That's going to attenuate some, and that's a little bit different I suppose than a regular interval and coastal or intracoastal.

MR. MYLES: Thank you, Shelby.

MR. DEGRAFF: Larry DeGraff. In our company, we have digitized some of the river charts from the books. And from Greenville down, they navigate on charts that we produced that are based on your charts, the vector charts. Once they reach Baton Rouge, we shift to NOAA charts. One of the requests was they said well, we want Corps charts below Baton Rouge. And I said, "Why would you want Corps charts?" They said, "well, on the Corps charts they show the fleeting areas. NOAA charts don't have fleeting areas."

And so I'm thinking maybe we should have two sets of charts, Corps charts down to the mouth of the Mississippi River, which they have in the existing books. And then in addition, you would have a NOAA chart and allow the operator to pick which chart he wishes to use.

MR. NILES: Larry, let me ask you, do you think that it's really as simple as one or two features that's the difference, in which case fleeting areas on the NOAA charts would meet their needs and they'd be happy, or does it go beyond that?

MR. DEGRAFF: Actually I think that you could approach NOAA and have them insert the required elements. I don't think there are a lot of elements, no. We have to ask the operators their opinion on it. Anybody that runs the Mississippi?

MR. WELLS: Ken Wells. Because we have so many operators that operate down the Mississippi and then on to the intracoastal waterways, I think our preference would be for what the Corps and for NOAA is doing to be for them to be working so closely together that it becomes indistinguishable. That may not answer your question.

MR. DEGRAFF: That was very good evasion, but the issue is can you define what is missing on the NOAA charts, the elements that are missing on the NOAA charts that are on the Corps charts that are of value to the tow boat operator from Baton Rouge down and on the intracoastal?

And then we could address a modified layer of S-57 into the NOAA chart or even an add info layer that we could supply from the Corps to our users in an overlay format that they could put over the chart. That would minimize the duplication of effort. But I believe that there are not too many features that are important. One was the fleeting areas. That was the one that was identified to me.

MR. DAVIS: Dick Davis again here. I want to second what Larry from Transas said. He's absolutely correct. His customers are telling us and have told me in Softchart what they want to use. Remember the customer is the most important part of the system. The tow boat industry and the intracoastal industry, those guys like the Kirbys of the world they are mostly coastal, but they do from time to time come up the rivers and want to use Corps of Engineers source material.

Softchart publishes and depends on a lot of customer regions. Where's there an overlap between NOAA and the Corps of Engineers, I publish both. The customer prefers using the Corps of Engineers' chart book information rather than the charts produced by NOAA. You get into politics here, and Tony can talk about it. If it's coastal water, it's the National Marine Service. It's NOAA's responsibility, and the Corps is going to have trouble taking that away from them and getting the funding to do it.

If it's a river, the Corps of Engineers should be doing it. The Corps of Engineers even along the coast is supplying the major source material for the NOAA chart right now by all the maintained harbors and the projects and everything else. That's Corps of Engineers' data just being put on to a NOAA chart.

If anybody should change, NOAA should change to really the Corps of Engineers, not the Corps of Engineers. Or just say, I'm going to publish it, too, even though you guys are. And guess what, NOAA will have three hydrographic offices here in the United States because there's another vector data set sitting out there called DNC. It's called Digital Nautical Charts.

Guess what? It's produced by the U.S. Navy by NMA, and currently it's the best vector data set in the world, and it is more complete. It's worldwide coverage and currently today has better U.S. coverage than NOAA. But guess what? You guys can't use it here in the United States because it has not been published and made available. And both our River Pro and our CAPN software because we are working with the U.S. Navy, it's available to over 1,500 of our customers.

But guess what? They're military. They're U.S. Coast Guard, they're U.S. Navy, or they're contractors. But it's strictly vector data with all those vector data features; turn things on, turn things off. They're day is done. In some cases it's better coverage than what NOAA is producing. And the taxpayers of America have already paid for it, but you guys can't use it. I mean there's all kinds of data floating around. But with respect to what Larry said, the Corps is doing a better job of charting inland waters than NOAA.

MR. NILES: Dick, once again thank you for your support. I think I can put the issue to rest. The Corps and NOAA are not going to make duplicate charts. That's already been decided. It's a done deal. That's not a good use of taxpayer money.

In the areas of NOAA charts, they have that product. They have that charting authority, and they certainly should be given the chance to make a product that the users want. Now, in the cases where there are a few features here and there that are not in their charts, I know that NOAA would like to know about those. And if possible, include them in. And if we have the data, then we'll make it available to them.

We haven't done a very good job of that in the past, but that's all part of this initiative, giving them information so that they can improve their ENC. And then in the areas where we have so much information, where it changes so quickly and they just can't handle all of it, but the users want it like the defined channel in the coastal areas, yes, we might produce a product that would be used in combination with or overlaid on the NOAA chart, but it doesn't duplicate.

MR. HASSELL: Bruce Hassell. I believe that you've stated in ten years we'd have all the completed charts. That's what you were looking for, for digital charting. And then, Ken, you were saying in 2006 all companies would have to have it in 2004. To me it's very important that we get these two dates together. The charting system has to come on-line the same as AIS.

Now, I know we've asked for a lot of bells and whistles every time we've talked, things like Shelby just mentioned. Maybe we need to back down a little bit to speed this process up and give us the basics like the foundation of the river, a good survey of the river; something we can build on. Give us all the river systems as quick as you can with the fixed objects, and not so much of what we've asked for, top bank and several different things. Maybe we can get that later.

But when AIS comes on, I feel we need to have all the river systems as correct as we can. On our system that we operate, our navigation system, we expect for every vessel to show up on it rather than radar. As Dick said, we don't want two boats passing in the corn field.

MR. WELLS: Ken Wells. Bruce brings up a point which causes me to ask a question. I'm going to ask you, Tony, but I'm going to actually want the answer from M. K. AIS is being promoted at this point as a security system as part of the need for maritime security. The Corps is very worried about security issues to the point where one part of the Corps is apparently trying to develop a transponder that will go on barges so that the locks will know what's going on with the locks. I'm not sure that that proposal has a leg to survive in part because the Coast Guard would have to be the one to require it. Their focus is AIS.

If AIS is the future for maritime security, and if it is going to be used on the inland system to give us, for instance, our vessels going through locks, Tony, why have

you been unable to get more money? Why is this not seen as a charting issue but as a security measure at least partially, and is there a role that we can play in trying to get the word out that AIS is not going to work without accurate charts? And then the question is, isn't that right?

MR. NILES: My boss is going to speak.

MR. MYLES: M. K. Myles, the Corps of Engineers headquarters. It's a good point, Ken. We'll get with the infrastructure security folks when I get back and talk about the E-charts; how they contribute to on-land security. We've talked to them some about that effort. But since it's a separate funding line and since the funding has been tenuous, I guess it wasn't necessarily an attempt to tie ENC's or IENC's or whatever they call these things over to on-land security. We have to discuss that thoroughly.

MR. WELLS: The first part is we as users are not going to reach out in understating maps within the Corps' role that this plays with AIS. The second is I think the President's budget anticipates more money will come for security. We're ready to argue for this being security.

MR. NILES: Right, good point.

MR. BLUME: Alan Blume from the Office of Local Traffic Management, the Coast Guard headquarters. This question of electronic charting has been the subject of a lot of discussion within my office actually since about Wednesday afternoon and longer, but it's the bulletin that was falling down most recently.

But one of the challenges that we've had as many as you know a while back, we did publish a request for comments on electronic charting. And that was a project that since September 11th has been stalled. And as many of you know, probably legally any kind of regulatory project that's not linked to security right now is basically almost on all stops. So, you don't have to worry about all the plethora stuff coming out of the building any time soon other than security issues.

But the challenge that we're facing or the question that we're asking right now is we realize that as of the first of July of this year, the 2000 provisions of SOLAS will come into active force. There are already provisions through IMO resolutions to allow the use of ECDIS as carriage requirements for paper charts with proper back-up, but that will definitely become very clear in the first part of July, 2002. And that's what's going to be happening in the international market in the vessels sailing internationally.

And we suspect that the first response from the domestic industry is going to be, it's good enough for them, what about us? How come we can't use electronic to meet our carriage requirements? You know, we're using them, but we still have to have this piece of paper on board. Those are questions we're wrestling with.

Now, there are some differences of opinion within the building in terms of whether a chart is a piece of paper, or whether a chart as it's defined by the IMO as a piece of paper or the database upon which that piece of paper, the image is generated; what works. That's being discussed. We're talking with NOS and asking them to tell us, as the hydrographer, what the chart is.

The point Ken made about articulating the need for this is something I think I will expand and say articulate it to the Corps, but articulate it to the Coast Guard as well. Basically we're trying to figure out how to get around the limitations within which we have to work. And one of those limitations right now is we just do not have the resource, or unless we can put a security tag on something, it's basically going to sit still.

And so the question we're confronted with is how can we legally permit the carriage of electronic charts and their full use, so you can maximize a utility without, creating some kind of friction? So, I leave that to you. But it is an issue that we are looking at, and I talked to Tony. We need to start looking at more and look forward to that. And the whole question of AIS, I'm not going there.

MR. NILES: Larry, let's do one more, and then we're going to have to wrap it up.

MS. CAMBRIDGE: Yes, this is Joedy Cambridge from TRB and the Marine Board. I just want to say to Ken if you do not feel that the inland operators were addressed adequately in the workshop in New Orleans last week, you simply make that known to the committee, and those issues will be taken up. We have a board meeting coming up on May 14th and 15th, and I'm sure that Craig Phillips, who is a member of the Marine Board, will certainly raise that question. But the committee is open to all the information, ideas, suggestions and criticisms they can get, so that we're sure that we address all the needs of all the industry when we prepare that final report.

MR. NILES: Larry, I'm going to pose one question here which was brought up by Cliff out of the Vicksburg district here, and this is an important one for us. Since I have the podium, I have the authority of the last one.

The issue was brought up of top bank. The districts are rather nervous about that feature on the electronic charts. So, I want to put the question to industry. Can you guys give me a good reason for our record here why that feature is so important.

MR. HOUSE: Shelby House again. That feature is important because it really does, as you stated before, change the dynamics of navigation in the river. Let's suppose you have a point way behind an island. The river comes up. Let's say it takes ten feet at Memphis for that to be all wet. The more you get above ten feet on the gauge at Memphis, the more water you have going behind that island. You may not have enough water to navigate there, and it's not the official navigation channel, but it still affects the current velocity. If you've got a lot of water trying to drag you off that way, you need to know about it ahead of time.

One really critical example would be just above Cairo Point on the Upper Mississippi above the Upper Mississippi River Bridge, you know, you have a dike closure there at 26 feet. Once you start getting water above 26 feet, it changes the entire dynamics and what you have to do to make that bridge. Behind the tow head if there's no water running back there, you have absolutely dead water right above the bridge on the left ascending side. Once you get above 26 feet on the Cairo gauge, let's say you have 36 feet, the top ten feet of the river is now going behind that island. Now, you have a cross current running right immediately above the bridge. And you have to know how to set up for that to navigate through that bridge.

And, yes, it's important information, whether it's behind an island or dike closure or whatever. It changes the way the current runs, and it's important. Thank you.

MR. NILES: Thank you, Shelby. Our bus is going to be leaving in just a little bit. I'm going to end it with two slides here. Where does it go from here? I want to keep the dialogue going. Something we've already done is we did get input from the industry a little over a year ago. You can see the ones who participated gave us the start on our content specifications. Those are the features they said they wanted in there.

And then we've done a demonstration on two industry vessels last September. So, they got their first exposure to a vector chart on the system. We want to keep the dialogue going with industry input on some issues; input for standards related to this. A lot of the details like S-57 may be transparent, but your input will help drive what we do with that.

Probably the biggest thing coming up will be test and evaluations of the initial IENCs we reproduce on the Ohio and the Mississippi at the end of this year. We will be looking to do some structured tests on some industry vessels to get some comments back from the users on those. And you can see a list of some of the standards that this would help us with; our own internal spec., RTCM-109 performance, the database standards, the ISO 19 through 79, and the display standard S-52, latest performance standard RTCM-109 that Fred was talking about.

Right now we don't have anybody from the inland towing industry involved with that standard. We do very well to have a few folks who actually are looking at that and giving some comments on it. Our own content specifications that I mentioned before are on our web site. We encourage you all to pull it down and take a look at it. Not just the features, but those attributes that go behind it.

And then we're also setting up a discussion site. Get on there, post your questions, your issues, keep the dialogue going. Our web site if you want to write that down is www.tec.army.mil/echarts. The web site will grow. More information will be added.

Folks, we thank you all for coming. This has been very beneficial. And if you're staying over at the Vicksburg Inn, let's keep the dialogue going. Thank you.

MR. DAGGETT: I just want to thank everybody for their participation. I think it's been a great start. Don't forget there are some handouts up there. We'll have some proceedings on this. I guess it will be probably sent to everybody that registered. And if you have interest in working with this committee, let me know.

Opening Session of the 100th Anniversary Meeting: Waterborne Transportation Strategies and Policies

Opening Remarks

By LTG Robert B. Flowers, Chief of Engineers, U.S. Army Corps of Engineers

I am delighted to be here today to welcome everyone to this year's meeting—a celebration of America's 100 years of participation in the International Navigation Association. I also take great pride in noting for you that the United States Army Corps of Engineers recently celebrated its 200th year of service to this nation since our founding by President Thomas Jefferson.

PIANC is one of the most prestigious engineering and scientific organizations in the world. It is a unique partnership between the Federal government, the international navigation community, private citizens and the organizations worldwide. And we in the U.S. Army Corps of Engineers are proud of our participation.

Since the first International Navigation Congress in 1885 in Brussels, PIANC has remained true to its founders' vision of an organization dedicated to sharing technical information on ports and waterways. America's ports and waterways have benefited greatly through PIANC's information sharing, as have governments and private sector members around the world.

The water resources challenges faced by members of PIANC and America in 1902 were great. On many levels, I believe they are greater today, but I will address that later. It's with great pride that Vicksburg hosts this year's meeting and I thank PIANC for allowing us this opportunity.

Vicksburg's association with PIANC actually predates America's formal participation in the organization. In 1892, Brevet General Cyrus Comstock, president of the Mississippi River Commission headquartered here, presented a paper at the Paris meeting. The subject was Improvements on the Mississippi.

110 years later, this nation and the Corps of Engineers are involved in another highly complex study concerning the future of navigation on the upper Mississippi River. However, let me assure you, that despite criticisms from some on the length of our studies, today's effort is not a continuation of General Comstock's 1892 paper.

PIANC's influence on the Mississippi can also be seen today in the revetment work along the river. Dr. Bunkichi Okazaki developed these concrete-block mattresses in Japan, and their low cost, durability and adaptability appealed to Mississippi River Commission engineers.

The Corps of Engineers placed its first articulated, reinforced concrete revetment in Vicksburg Harbor in 1917. The Corps later developed the mat-laying machine that continues to work on the river today.

I am also proud to share with you three distinguished U.S. Army officers who contributed to PIANC. Colonel George Goethels, who led America's completion of the Panama Canal, also led the U.S. Section of PIANC at the 12th International Navigation Congress in Philadelphia in 1912.

Lucius Clay, a delegate to the 1934 International Congress in Brussels, became the youngest general officer in the Army in 1942. In 1945, he became the military governor of Germany, eventually guiding the creation of the German Federal Republic in 1949.

Lieutenant Colonel Ray Wheeler, secretary of the section in 1938, later became the 36th Chief of Engineers from 1945 to 1949.

We are pleased to build on our great relationships of the past, and look forward to working together in the future. As we look forward, though, the challenges faced by the world are many when dealing with water resources and infrastructure. As the population increases, so too does pressure on global water resources. There is increasingly greater competition for water to provide for health and welfare, to grow crops, and to protect its quality for the environment. 70% of the earth's surface is water; but only 3 % is the freshwater on which humanity survives.

Nelson Mandela, at the release of the World Commission on Dams Report in the Fall of 2000, said, "Freedom alone is not enough without light to read at night, without time or access to water to irrigate your farm, without the ability to catch fish to feed your family."

Two-thirds of the people on this planet have inadequate sanitation. More than half have no access to clean water. Floods continue to kill more people than any other disaster, and droughts precipitate famine on an increasing scale.

With population growth, the development of maritime technologies, and a growing global market for goods and services, pressure is also increasing on the world's ports, harbors, and inland waterways. The complexity of water resource issues is often underestimated. I believe, as do many others, that water will be as important in this century as oil was in the last.

States have sovereignty over the water within their borders, yet water knows no boundaries. It flows across jurisdictions. So too must international agreements on the use of these resources to serve all who depend on the water.

If each jurisdiction or interest were to develop, preserve, or use water to maximize their interest, we would have chaos. We must have coordinated and cooperative policies that ensure the interests of all are served. This is a public responsibility that cannot be accomplished simply through regulations or markets. It requires engineering, management, and planning expertise that will find optimal ways to use these resources for the greatest good of man and the environment.

This is an area in which PIANC's long-established reputation, relationships, and expertise can continue to serve the global community. PIANC continues to be relevant to national and international debates on the use and development of global water resources. Internationally, PIANC helps to shape navigation policies, including dredging and disposal guidelines. The organization is unique though because all navigation interests are represented—deep draft commercial ports, inland waterways, recreational boat harbors, and others. No other organization provides such an effective forum for all navigation interests to come together on an equal basis to solve problems and resolve conflicts.

Within America, I hear periodic calls for “Corps Reform.” My organization has changed many times over the past 200 years, and we welcome further changes that enable us to better serve America and her people. The real issue at hand though is much greater than simply making changes to the Corps.

Within this nation, and in many others, the focus must be aimed at establishing a national policy for the management of water resources. We need to examine and debate in a public forum how best to balance the competing demands for water with a broad, holistic watershed approach. The debate must involve all stakeholders—federal, state, local, environmental, recreational, industry and shipping. It must be an open, inclusive process that gets to all the issues and lays out a course of action that sets a direction for the nation far into the future.

I offer to you today what I consider to be the five main water resource challenges facing us.

The first is effective relationships. As we advocate holistic, watershed approaches, we must seek to build collaborative, cooperative consensus within America and between nations, organizations and people.

Second is infrastructure renovation. Most of the U.S. water infrastructure is more than 50 years old and in need of repair. The nation's investment in and commitment to maintaining this infrastructure must be part of the national debate.

Policy alignment is the third issue. We must update old policies to reflect today's demographic realities, and to anticipate future requirements.

Technology support is the fourth issue. We must find ways to invest in and capture technological advances in software and hardware, GIS, and other tools to enhance water resource management.

The final issue is ecological design. A common issue around the world is how to create a balance between the needs of humanity, the environment, and the economy in the use of water.

However, make no mistake; there are no easy answers, and we know that. We welcome our partnership with PIANC as we face these issues together.

I congratulate the U.S. Section of PIANC on its 100 years of service, and thank all those who have gone before us in service to this organization. I also thank PIANC for its global commitment to water resources development, and wish you all the best for a highly successful meeting.

Essayons!

Opening Session Address

By Mr. Dominic Izzo, Principal Deputy Assistant Secretary of the Army (Civil Works)

General Flowers, General Griffin, Mr. Van den Eede, Commissioners, members of the U.S. Section of PIANC and guests,-- I am pleased to be with you to celebrate 100 years of a unique partnership between the government and the private sector. PIANC's unique combination of government, corporate, university and private membership generates a synergy that has contributed in many ways to our prosperity and growth.

I was first introduced to PIANC in the private sector a few years ago by Mr. Leonard van Houten, a member of PIANC, when we were working on a major new port development overseas. As often happens, there were many issues between engineers, the business developers, shippers, and the local community. The business folks thought we were spending too much money and gold-plating the facility; the shippers and the local community thought we were building something unsafe and environmentally hazardous. We were able to put many of those issues to rest when Len brought out some well-established PIANC papers.

Over the past year I've become even more convinced of the value of PIANC research in helping to keep America's navigation system capable of meeting the demands of world trade. Through meetings such as this, we learn what is being done elsewhere and are exposed to new ideas that can lead to projects to benefit all Americans.

In my time with you let me offer some thoughts on the state of the Nation's harbors and waterways, then speak to two areas – one old, one new – where the experience and brainpower of PIANC can be of great service to us.

I. Deep draft Navigation

In 2000, the nation's harbors handled nearly 2.5 billion tons of cargo, including nearly 1.4 billion tons of foreign trade. Indeed, foreign trade now accounts for 27% of the Gross Domestic Product, up from 8% in 1959. Nearly 44% of the world's merchant fleet visits U.S. harbors.

Many forecast that U.S. waterborne commerce will double over the next 20 years. Containerized cargo, among the fastest growing segments, nearly should triple over the next 20 years. Increasingly, shippers are using larger vessels in world trade to improve efficiency, reduce environmental impacts, and, naturally, to lower costs. The number and size of containerships are increasing, including many vessels requiring channel depths greater than 13.6 meters¹. Currently, few U.S. ports have such depths. Given the time it takes to design and construct deep draft port projects, we have typically been,— and likely will remain,— a generation behind vessel designs in our port capabilities.

¹ 45 feet

However, the President's FY03 budget did fully fund the 15-meter² port deepening for New York Harbor; that's a \$120 Million commitment to deep-draft navigation.

As Federal steward of the nation's navigation system, the Corps of Engineers maintains our harbors and develops new projects to expand and meet the needs of the future. Our challenge is to obtain funding for priority maintenance and expansion, and then to budget efficiently to optimize construction time and cost. We need more funding to reduce the serious maintenance backlog at many deep-draft navigation projects.

The challenge, however, does not rest with the Federal sector alone. Many port authorities and private terminals will need to make landside improvements to handle future traffic. The interdependence of channel improvements and landside investments means that improvements must be made to both if we are to realize maximum economic benefits.

II. Inland Waterways

Now let's take a look at the inland waterways – a major focus of this meeting. We operate and maintain 20,000 kilometers³ of commercially active inland and intracoastal waterways with 192 lock sites. Almost all of these waterways travel through estuarine or riverine habitat, which most Americans rightly consider a natural treasure, which the Corps is also tasked to protect and restore. Our challenge is to maintain and improve this phenomenal navigation system while we protect and restore habitat. This is the 21st Century challenge of smart growth and no one can do it better than the U. S. Army Corps of Engineers.

As you probably heard, the group "American Rivers" recently announced that the Missouri River is the most endangered river in America and blamed the Corps and, by extension, navigation for it. The best I can say about American Rivers is that they are obviously misinformed and misguided. The Corps been an honest and faithful steward of the Missouri River for over 200 years, every since two Army Captains, Lewis and Clark, led a team of soldiers and explorers from Saint Louis to the Pacific. Today, we are working on arguably the most ambitious riverine habitat restoration program in the world,-- the Missouri River Fish and Wildlife Mitigation Project.

To date, the Corps has acquired about 14,000 hectares⁴ of floodplain at 28 sites from Gavin's Point to the Mississippi and is restoring it as wetlands and bottomland hardwoods. This is a tremendous success; at some completed sites, we have more plant species than Lewis and Clark cataloged 200 years ago. We have even documented the first reproduction of the endangered Pallid Sturgeon in modern times. Frankly, I think American Rivers has the wrong river.

² 50-foot

³ 12,000 miles

⁴ 30,700 acres

Furthermore, Congress has authorized the Corps to acquire a total of 75,000 hectares⁵. This year, in a wartime budget, with many competing priorities, President Bush included \$17.5 Million to move this program forward, making it one of our top five Civil Works' priorities, and demonstrating clearly the Administration's commitment to real environmental progress.

The inland and intracoastal waterways move over 630 million tons of cargo annually (15% of intercity freight by volume), at an average transportation savings of \$10.67 per ton over ground transport— providing roughly \$7 billion annually in savings, not to mention lower energy use.

A 15-barge tow moves more cargo by inland waterway than 200 rail cars or 800 tractor-trailers with less fuel consumption, less air pollution, less noise, less urban congestion and almost no negative community impacts. Only in an ivory tower or in the world of politics could someone claim that navigation was bad for the environment.

The inland waterways serve strategic economic purposes. Coal, which powers 50% of U.S. electricity, is the largest commodity by volume. Inland waterways move over 20% of the coal destined for U.S. power plants. Imagine if that coal had to be replaced by oil from the Mideast.

Farmers, meanwhile, depend on the waterways for low cost transportation to be competitive. More than 68% of corn and 71% of soybean exports move by inland waterway. It should therefore come as no surprise to you that the Department of Agriculture and the Department of Transportation are strong supporters of inland navigation.

Unfortunately, much of our inland navigation infrastructure is aging and in need of repair. 51% of Corps lock chambers are over 50 years old – generally considered the “design life” of a lock. I visited Lock and Dam No. 11 on the Upper Mississippi last summer and I can tell you that we have pushed that facility about as far as we can go.

We have an active research program, devising ways to extend the life of these facilities even further and keep them in service. PIANC plays a major part in this research, not only through the expertise of its U.S. members, but by fostering contacts that allow us to learn from the experiences of other countries.

Still, in spite of our best efforts, annual hours of lock “unavailability” more than doubled during the 1990s. Sitting in queues resulted in an estimated cost to industry of nearly \$160 million. Through the 1990s 25 lock sites had average delays of 1-12 hours for every tow processed. Yet only 7 of these lock sites have replacement projects under construction or authorized.

Another challenge is capacity. Only 15% of our lock chambers are 1,000 feet long; 25% are less than 600 feet long. Locks with 1200-foot chambers can accommodate

⁵ 166,000 acres

a tow of 17 barges plus the towboat. 600-foot locks can accommodate at most eight barges plus the towboat, so typical 15-barge tows passing through a 600-foot lock must be “cut” into two sections to pass the lock, more than doubling locking times.

Inland waterway traffic is projected to increase by about a third to over 830 million tons by 2020, stressing aging locks and adding to congestion and delays.

WRDA '86 launched an aggressive lock modernization program, with \$1.7 billion so far invested in 14 locks and another \$3.4 billion programmed for construction at 13 more locks. But under-funding of construction schedules for ongoing projects has increased construction time (by 1-5 years and growing) and cost (nearly \$250 million), foregoing significant project benefits. We have been able to address this problem internally by stopping new starts and prioritizing important work like Olmsted Lock and Dam.

Modernization of inland waterways infrastructure is cost-shared 50/50 from the Inland Waterways Trust Fund, which has a \$400 million surplus. A fuel tax paid by the towing industry generates about \$130 million annually. Obviously, one solution for this problem is for Congress to provide more money when the wartime situation allows us to provide matching funds to use this surplus.

In addition, the Corps needs adequate O&M funds to reduce the critical maintenance backlog at locks and dams and on inland waterway channels. Witness the increased incidence of lock unavailability time and failure to maintain adequate channel depths on various inland waterways, most notably the Atlantic Intracoastal Waterway. Again we have addressed this problem internally by moving funds from new work and studies to keep the maintenance backlog in check.

III. Waterway policies

The theme of this 100th Anniversary meeting is “Waterborne Transportation Strategies and Policies,” and I note that much of this meeting will deal with comparing U.S. policies to those of Western Europe – most appropriate for an internationally focused organization such as PIANC that seeks to have nations learn from each other’s experience.

It appears that in the waterborne transportation sector, the U.S. and Western Europe have come up with different, and sometimes completely opposite, strategies and policies. European countries long ago concluded that they need incentives in favor of rail and waterborne transportation to deal with congestion problems on their highways.

They realize that inland and coastal waterways have distinct advantages in capacity, safety, and environment.

I recognize that direct comparison between different countries is not always possible. There are economic, social and legal factors, which may justify certain development in one country, and prevent the same in the others. A good example is container on barge services, well implemented in Europe but, so far, limited in the U.S.

At the same time, the current situation in Europe can be considered a taste of what may happen in the U.S. Traffic density and land availability currently create congestion in Europe at a level, which can be expected in the U.S. in the next 10 years.

Accordingly, the objective of this session is to understand factors, which lead to differences in the strategies and policies toward inland and coastal waterborne transport in the U.S. and Western Europe. This understanding may contribute to national transportation policies in the U.S.

IV. Beneficial use of Dredged Material

Now let me turn to the two initiatives I mentioned earlier. One has been a constant theme of the Corps and PIANC for years – beneficial use of dredged material. Many of the corps experts, who have made significant contributions to the PIANC working groups on beneficial use, work at the ERDC labs here in Vicksburg.

The greatest challenge we face in maintaining our waterway and harbor channels is what to do with about 188 million cubic meters⁶ of dredged material each year. For years, people referred to the material we move as “dredge spoil” to be avoided at all costs. Now the public is realizing, through efforts in which PIANC has played a major role, that dredged material can be put to good use. Coastal communities want it – either as beach sand or for underwater berms to reduce wave action and erosion. So do many environmental interests, who want it to shelter fish spawning areas or to build island and wetland habitat.

At least 95% of the material we dredge each year is clean, uncontaminated soil. We have to develop policies that provide incentives for beneficial use. I’m pleased to note that about 30% of the material we dredge is put to beneficial use, and this percentage is increasing. But we have to do even better in this area.

Challenges are still there: particularly in managing that remaining 5% of our dredged material that is contaminated. PIANC, with its wealth of technical expertise and international connections, will play a major role in helping us meet those challenges.

We also need to be proactive in management of dredged material. Regional Sediment Management will give us the capability to manage navigation mission proactively and optimize the beneficial use of dredged material.

Our R&D program is developing tools to give project managers the ability to predict shoaling and dredging requirements, and plan accordingly. Your ideas are always welcome.

V. Estuary Habitat Restoration

Now let me enlist your support for a new initiative. The Corps of Engineers is participating with other Federal agencies to implement the Estuary Habitat Restoration Act - a nationwide program to restore 450,000 hectares⁷ of estuary habitat by the year 2010. Obviously, every one of our major ports is located in an estuary and the expansion of these ports at the same time we protect and restore habitat is both a challenge and an opportunity to demonstrate that we can do sustainable development and have smart growth.

⁶ 250 million cubic yards

⁷ 1,000,000 acres

Industrial society and a burgeoning population have challenged the natural beauty and wildlife that the original settlers first saw in our native estuaries. Restoration will require good science and innovative technology. To achieve this goal, we are establishing a strategy and rules for selecting projects developed by local coalitions.

The Army, the Department of Commerce's National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Department of the Interior's Fish and Wildlife Service, and the Department of Agriculture's Natural Resource Conservation Service have formed a council to develop a strategy for implementing this Act – and I have the privilege of chairing it. After we complete our work on outlining the national strategy, we will turn to developing criteria for approval of projects. Then we'll be able to look at specific projects as candidates for funding. Our goal is to have strategy and procedures in place to receive proposals in time to recommend the first projects for the FY 04 Budget.

This restoration program was the crowning achievement of the late Sen. John Chafee of Rhode Island. He saw the Act as his legacy and a way to get agencies to work together. His son, now Sen. Lincoln Chafee, is working with Sen. John Warner (VA) and Rep. Wayne Gilchrest (MD) and others to secure funding.

Much of the impetus behind this Act also came from non-government organizations such as Restore America's Estuaries. Their vision has been to engage government agencies, the private sector, and volunteers to deliver on pent-up demand for restoration projects. This partnering, we believe, is the most effective way to engage the Federal Government in helping to solve local environmental problems and we are happy to be part of it.

I'm also pleased to note that, aside from the Estuary Habitat Restoration Act, the President included \$2 Million in his FY 03 Civil Works budget for a new start on an estuary habitat restoration project on the lower Columbia River in the Pacific Northwest. This is the beginning of a \$30 Million multi-year effort to restore estuary habitat critical to the recovery of native salmon in the Columbia. This environmental restoration project is the only new construction start in the President's budget. It is yet another demonstration of the importance that the Administration attaches to the environment, to habitat restoration, and to sustainable development and smart growth.

VI. Conclusion

Perhaps the most striking thing about the Estuaries program is the partnerships it fosters – among agencies and between the government and the private sector. So in closing, let me reiterate that, in old missions and new, partnering will be the way Army Civil Works does business.

We will work closely with maritime users and other stakeholders to ensure safe and reliable navigation channels to support the economy and enhance national security, while we protect and restore habitat. We can do it all. We can have smart growth and sustainable development. It just requires good planning, effective partnering, outstanding engineering, and funding. The Transportation Research Board of the National Academy of Sciences put the need well: "The costs of maintaining waterways, airports, and air traffic control systems...are substantial. However, the price of not keeping up with transportation system demand is decreased productivity, products that are less competitive, and a lower standard of living."

For the next two days we will hear presentations on policies and strategies concerning two vitally important components of our transportation system – inland and coastal waterways. We will compare the systems of this Nation to those of Western Europe. I invite your full participation in the discussions here – both formal and informal - and look forward to continuing the discussion in other venues after this meeting is over.

Together, we can ensure Nation's water transportation system continues to be our trade window to the world, while doing its part to keep the Nation's economy strong, and preserving our natural treasures, our river and estuaries, for generations to come.

A Look at PIANC-History: Presentation on 1902 Dusseldorf Congress

By Mr. Hans Peter Tzschucke, Ministry of Transport, Building and Housing, Germany

Ladies and Gentlemen, I would like to thank you very much for your kind invitation and for giving me the opportunity to present today a small part of the historical development of the International Navigation Association (PIANC).

First of all this presentation offers me an excellent platform to send you the congratulations of the German PIANC section on the 100th anniversary of the foundation of PIANC's U.S.-section.

Before giving attention to the Navigation Congress 1902 in Düsseldorf, I would like to make some short remarks on the development of PIANC up to this date.

The quick industrialization at the end of the 19th century required considerable improvements in development and extension of inland waterways and harbours, to be able to cope with the strongly increasing transport mainly of bulk goods. Therefore many countries made important efforts to improve the useability of rivers for navigation and to connect them by canals, to build up extensive nets of waterways. And these waterways should exceed the boundaries of the individual states, where possible.

At that time congresses, in which internationally acknowledged, high-ranking professionals participated, were often chosen as a very effective way, not only of mutual information exchange and discussion, but also for preparation of decisions on important technical questions. During a study tour of experts from Belgium, the Netherlands and Germany, the Belgian engineer Auguste Gobert suggested to organize congresses for inland navigation also. Together with a group of Belgian private persons, who aimed at improving the connection between the Belgian inland waterways and the seaports, he realized this idea very quickly and already in 1885 he organized the first Inland

Navigation Congress in Brussels. With 400 participants coming from 13 nations this event was a great success.

Therefore with an interval of two years, similar events took place in Vienna, Frankfurt, Manchester, Paris and The Hague, on the initiative of the inviting town. For the course of the congress the respective organisation committees chose the basic structure, which is still valid today. This means detailed questions published in advance, discussions of submitted papers, working out conclusions and having technical excursions.

In 1894, during the congress in The Hague, it was decided to unite with the Ocean Navigation Congress. The latter was founded in Paris in 1889 at the occasion of the World Exhibition and its 2nd meeting had taken place in London in 1893. For all future congresses the name was changed into „Navigation Congress“ and the questions to be parallelly dealt with were separated into two sections. This was after all kept up to the last congress in 1998 in The Hague.

Later in my presentation I will also shortly deal with the creation of a permanent organisational structure for these navigation congresses, a topic which was repeatedly suggested since the first congress.

Now, for the 9th Navigation Congress, Düsseldorf invited the international community of experts. The city was strongly supported by the German Central Government – also in financial respect. For at that time the inviting city had to meet all the expenses.

Why especially Düsseldorf made the invitation? Since the industrialization in the second part of the 19th century Düsseldorf was the commercial and economic centre for the whole „Ruhrgebiet“, the biggest industrial area in Germany. Even today, the „Ruhrgebiet“ is one of the most important economic areas in Europe, comparable with the areas of London or Paris.

The year 1902 was very important in Düsseldorf's history. In 1902 the German Trade and Industry Exhibition took place in this city. This exhibition was considered as succession, but as well as answer to the World Exhibition 1900 in Paris, on which the German industry felt not represented sufficiently. This is a view on some exhibition buildings along the river Rhine.

Consequently the town was well prepared also by extensive construction measures. I would like to mention only those which are of interest for navigation and waterway engineering:

The existing ship bridge across the river Rhine was of course a danger for the navigation. On this picture you see it in opened condition during the passage of a cargo ship. First of all, it impaired the traffic between the two riversides. Thus it was replaced

by an impressive arched bridge. It had a total length of 638 m and the span of the two arcs is 181 m each. It was one of the first arched bridges with such a wide span across the river Rhine.

Also the riverfront should be redesigned as a new and high water free avenue and riverside promenade. Therefore the bank was moved far into the Rhine with a new quay wall. In March 1902, only after three years of construction work this new, very representative area of the riverside was opened. And this photo shows the Rhein-front 100 years later.

Some time before the new harbour, upstream of the town, was opened. This aerial picture shows the harbour after a later extension with the big basin (left side of the picture). In 1901 the harbour had a total cargo turn-over of 583.000 tons. A large part of the harbour today is transformed into a marina.

So, in the year 1902, the city of Düsseldorf had a lot to offer to its visitors, when it invited the IX. Navigation Congress from June 29th until Juli 4th. Following the tradition of previous congresses, the patronage was provided by HH the crown prince Wilhelm. This, of course, also promoted the public interest in this event.

1756 participants followed the invitation, about half of them coming from 26 foreign countries. The Congress was also attended by 299 ladies. This is the only picture showing some of the participants I could find in the archives. By the way, I learned from the proceedings, that while the gentlemen had the final dinner the ladies were invited for tea by the Lord Mayor's Lady. Fortunately in the meantime this habit has changed.

After the foundation of the U.S. section of PIANC in June 1902, an official delegation of the United States participated for the first time at a Navigation Congress. The group consisted of 16 persons led by Lieutenant Colonel Charles W. Raymond of the U.S. Corps of Engineers. Remarkable is the big number of foreign journalists. When reviewing the documents I counted besides 23 representatives of German news papers, magazines and press agencies, the same number of foreign correspondents. This is a clear sign of how much interest the public had in the navigation congresses at that time.

Not only the meetings of the Congress took place at the concert building of the town. At the same time there was a very comprehensive waterways and navigation exhibition, where the participants were also informed about the latest national and international projects of waterway engineering and technical developments.

But there was a further peculiarity. Under the congress-halls was the wine store of the city of Düsseldorf. About 400.000 liters of wine in barrels and bottles were deposited in the large cellars. May be, this inspired the thoughts of the participants during the sessions. As far as I know, never again a Navigation Congress had its meetings on a wine store.

As I mentioned before, the congress was divided into two sections, with three topics each:

1 technical

1 economic

1 question, which was of special interest at that time.

For the 6 topics 40 reports had been submitted and published before the congress in the three official congress languages French, English and German. German was an official congress-language until 1935. Reporter General for each question had evaluated the reports. Their reports published in the three languages also beforehand were the basis for the very intensive discussions during the sessions. The results of these discussions were fixed in conclusions, that means recommendations and subjects for further research, which were passed at the plenary session at the end of the congress. These conclusions were sometimes also the impulse for the installation of Study Commissions. I mention here only ICORELS (International Commission for the Reception of Large Ships) and ICOLD (International Commission on Large Dams). The latter developed into a separate, today also worldwide acting association.

For reasons of time I will not look in the subjects in detail. You can find them in the proceedings and also in an excellent synopsis in the PIANC-Centenary book, which was published in 1985.

Besides the reports on the given questions, the so-called communications, which were also published before the congress, offered the opportunity to inform soundly on actual topics and to exchange or complete information during the congresses.

I also don't want to go into detail of the 43 communications, which had been submitted to the Düsseldorf congress. Here in Vicksburg, the headquarters of the also abroad well known Waterways Experiment Station, I would like to give you just a single example for the excellent quality of such communications. On the III. Navigation Congress in 1888, Reynolds presented in such a communication for the first time his thoughts on the physical laws governing hydraulic investigations in river models. Reynolds was a British scholar who did important research in hydrodynamic problems. Reynold's laws on models are still valid today.

Following the repeated suggestions to give the Navigation Congress a permanent structure, the VIII Congress in Paris had passed the decision to change the study commission for investigation of organizational questions into an International Commission. And also a Permanent Bureau should be constituted from among its members. This Bureau should be seated in Brussels, the birthplace of the Navigation Congresses. These bodies should not only make arrangements for the next congress but should as well fix the requirements for a permanent organization.

In the course of the Congress in Düsseldorf a meeting of the Permanent International Commission was held on 2nd July. There it was announced that nearly 20 governments had already agreed to give financial support to the proposed Association.

Thus, the financial basis was guaranteed. Then the draft of the statutes was discussed in detail and passed. If you look in the minutes of that meeting you will find, that they discussed nearly the same subjects we are doing at the moment by revising these statutes.

This was the formal foundation as a formal organization. Therefore the 2nd of July 1902 is the birthday of the Permanent International Association of Navigation Congresses. This year, may be on the 30th congress in Sydney, we could celebrate its 100th anniversary.

The congress finished with numerous excursions, during which the participants had the opportunity to get to know various technically very interesting facilities and constructions in Germany. To conclude, I would like to introduce two of them to you:

First, we are going to Henrichenburg. Here the participants could visit the ship lift, which started operation in 1899. It has a lift height of 13.5 m and could be used by ships up to 800 tons. At that time it was not only the biggest ship lift in the world but also the first, in which the weight balance is made by floaters. Because of this balance the ship chamber with a total weight of 3100 tons could be moved by one single engine of only 150 hp. It is today a historic landmark.

However, soon this ship lift could not cope with the strongly increasing traffic. If you visit this place today, you will find a real park of locks, Some people call it a working museum. You can recognize very well the development of the various types of constructions and dimensions. In 1962 a second ship lift following the same principle was built. It is suitable to lift ships up to 1350 tons.

Second, we are going to the Kiel-Canal. After 12 years of construction the Kiel-Canal was opened in the year 1895, being the second largest sea-canal in the world. This photo – taken during the building period – shows one of the 10 high bridges crossing the canal. The experiences gained during construction and then operation of this canal had been of special interest for the American participants in the Navigation Congress, for in 1901 the United States of America had gained the rights to build the Panama-Canal. And the head of the U.S. delegation, Lieutenant Colonel Raymond, informed in his speech at the final session, that the US-Congress had given its agreement on the construction of this interocean-canal only few days ago.

The Kiel-Canal connects the North Sea with the Baltic Sea and saves the navigation about 250 km. With about 38.000 ship passages per year it is the most frequented sea-canal in the world. Already in the year 1900, more than 25.000 ships went through. Nowadays, ships with a length up to 235 m can use it. However, because of the passage through bridges, their height may not exceed 40 m.

There are locks at both ends of the canal, regulating the changing water levels of the Baltic Sea and the river Elbe, respectively. On the picture you can see two groups of locks – that is because only a few years after opening the dimensions were no longer sufficient and the construction of bigger locks was started in 1907 and finished in 1914.

In that year also the Panama-Canal was opened on August 15th. Based on the experiences known internationally about the increasing of ship dimensions, the dimensions of the locks at the Panama-Canal were chosen very big all from the beginning. They are nearly the same as the new locks of the Kiel-Canal.

Coming to the end of my presentation i would like to show you one example of an unusual solution of a technical problem. This suspension- ferry is hanging under a train-bridge above the water level. It has the remarkable capacity of 42 tons and is still in operation today. The participants of the Navigation Congress also had visited this ferry, for it was opened in 1901. The ferry now brings us back to our century.

All the best for the next 100 years for the US section of PIANC and for the US Corps of Engineers, who has been supporting the US-PIANC Section very strongly since the beginning and in this way also PIANC-International.

Thank you for your kind attention.

Introduction of Technical Program, Day One

By Dr. Anatoly Hochstein, National Ports and Waterways Institute, University of New Orleans

Ladies and Gentleman...To open our discussion, I need to introduce myself. In doing so, I will try to be as modest as I possibly can. My name is Anatoly Hochstein. I'm Director of the National Ports and Waterways Institute, University of New Orleans. I have been a PIANC member as long as I can remember.

I believe that the subject we brought to your attention is the most appropriate for a celebration of the U.S. section Centennial Existence. The subject of our sessions reflects both a role and evolution of PIANC.

The role of PIANC is to bring together professionals from different countries and different maritime systems and from professional exchange generate practical recommendations. That's exactly what we intend to do today. It is also an indicator of evolution, how PIANC has progressed in its functions. Originally, it was created as a purely engineering association, mostly addressing designs of maritime facilities. Today, however, we are about to discuss policies, strategies. This manifests recognition that even the best design cannot be effective if our policies are not right.

We have a unique opportunity today to compare notes with our European friends, and we're very grateful to them for having come all the way to Vicksburg to have this discussion. And again, it is an indicator of how important this type of exchange is on both sides of the Atlantic Ocean.

I have always been fascinated by similarities and differences between American and European waterway systems. In terms of physical parameters here in the United States, we are quite ahead. Our waterway dimensions, length and density of traffic are all higher than in Europe. In terms of diversification of functions, however, the European system presents better examples.

Here we are able to move huge tows, with the capacity of 60,000 tons and very low costs. Costs of inland water transportation in the United States are about five times lower than in Europe. At the same time our system is very homogenous, limited to tows moving primarily bulk cargoes and nothing much more. In Europe, however, the fleet is divided more or less 50/50 between self propelled and barges. European waterways are integrated into intermodal activities much more so than here in the United States. Waterways are one of the major venues for moving containers. In Europe, Coastal or short sea shipping by volume is second only to highways, being responsible for about 44 percent of total freight.

In our case, the share of coastal shipping is very limited and in recent years is on decline. Inland waterways systems, both in Europe and in the USA however, are not very successful in gaining market share, at least in the last decade. As we compare our waterway systems, I think that it would be difficult to avoid a syndrome of "the grass is always greener in the neighbor's backyard". We're all here, members of PIANC and therefore, obviously patriots of water transportation. We all wish water transportation would flourish. We all feel discomfort if we see that some of our policies and strategies do not provide a fair recognition of the benefits provided by water transportation. The question is about

the degree of such recognition in the US and in Western Europe.

For instance, in preparation for this session, we had an interesting discussion with one of our panelists. She said that user charges in Europe negatively affect the market for water transportation. It is painful, I fully agree. And I'm sure that she's absolutely correct. However, in relative terms what we do see, in Europe, major waterways are free of any user charges. There is a nominal user charge for usage of man-made canals, specifically for lockages, which collect roughly one, maybe two percent of total expenditures of inland waterways in Western Europe.

In the US, as you well know, we collect at least 20 percent of total costs of capital improvements and maintenance of waterways. So, it's painful to both sides, but as you can see, the degree of this pain might be completely different.

Since the beginning of the 90s as far as I know, the European Union began to issue so called White Papers. The document is issued by the highest authority in Western Europe, the European Commission. The document defines directions and policies for transportation development, including water transportation. The latest version of the White Paper was issued in September 2000. It is a continuation and elaboration of the document issued in the 90's. These documents, the original and the latest, very clearly state that priority needs to be given to environmentally advantageous transportation modes such as, rail inland waterways and coastal (short sea) shipping.

The rail is mentioned because rail is not in such good shape in Western Europe in comparison with the United States. A freight distribution here in the United States, between roads and rail is much more balanced than in Europe. What is remarkable in the above statement that it directly gives priority to one mode, water, relative to others.

Moreover, this document even goes further, stating that without regulated competition — that is a term quoted “regulated competition” — we cannot expect that a sufficient balance between modes of transportation can be achieved. We do not have a document like this. Just searching for some type of similarity, I can mention Marine Transportation System, MTS. However, it's kind of a different initiative. While the White Paper does not hesitate to attach priorities to transportation modes; MTS' objective is basically the coordination of different agencies, which are involved in water transportation; and to establish dialogue between private industry and the public.

Here, in the USA, we're very hesitant to announce priority of one mode of transportation over another. It is for some reasons considered to be totally unacceptable in the United States. Further, White paper defines about 60 different measures to promote the stated policy of balancing competition in overall transportation. Many of these measures are directed to water; inland waterways and coastal shipping.

One of the major drivers for defining priority of water transportation in Europe is the perceived environmental advantage. In accordance with the study published by the E.U., highway traffic is responsible for about 96 percent of so called social costs. Social costs include air pollution, energy usage, safety of operations, congestion, noise and so forth. Two percent attributed to rail, and only 0.5 percent to water transportation.

I don't know if similar nationwide evaluations exist in the United States, but I am sure that our numbers would come very close to the same type of indicators. In fact, if not on a national level then on some more local level, we at the Institute have tried to make this evaluation. We came to the conclusion that, if we take into account the social and environmental costs, then some water transportation projects, we chose as examples, would have twice as high the net benefits. So, environmental costs are quite substantial. In full realization of this phenomenon, it is my understanding that in Western Europe there is a debate going on to initiate substantial increases in user charges for highway systems, to reflect the cost of environmental impacts. You can imagine that as soon as we include the environmental and social costs in the user charges, the balance would change dramatically in favor of water transportation.

As of today, in the United States, we do not really have sufficient mechanisms, and we don't even debate much to introduce these mechanisms, which bring environmental costs into the equation. The inclusion of environmental/social costs in our planning for transportation systems development may significantly affect the actual allocation of traffic between different modes of transportation.

So far, however, a different attitude prevails in the U.S. As an example, I can comment on a well-known case of the upper Mississippi development plan. The project was evaluated by a very prestigious panel, organized by the Academy of Sciences. If you read this document, you can see that this panel demanded a very, very vigorous, very precise evaluation of environmental impacts of waterways expansion.

I would even venture to say that if we attempt to deliver this type of evaluation to the letter of the recommendations, we would hardly be able to conclude any waterway project. And why? Because we're supposed to evaluate minor environmental effects, which are sometimes physically impossible to determine. After all, how can you quantify something, which hardly exists?

At the same time the very same document didn't say one single word about what would happen if waterways couldn't absorb the traffic. And this traffic has to move over land modes of transportation. And what kind of environmental impacts would be created by this reallocation of traffic?

In other words, we consider environmental and social costs in absolute rather than in relative terms. Judging by all the documents that I have had a chance to review, it's not the case in Europe, multi-modal projects do attempt to compare environmental losses and environmental benefits both with and without water transportation development.

I would say that there is only one problem and one mystery we share with Western Europe in the United States, it is that we are, without question, the cleanest, the most environmentally friendly mode of transportation, and for some reason, unable to be friendly with environmental groups. Why that is the case, I do not know. Hopefully, in our panel discussion someone will unveil this mystery.

One more subject I have neglected to bring up. That is, the formulation of national intermodal transportation systems and, the place of water transportation within these systems. In Europe, planning of intermodal systems focused on the Trans-European Network, TEN Program. This program defines specific corridors with priority for financing and with priority for implementation.

In the TEN system, I quote, "twelve percent of this system is devoted to inland waterways."

Again, trying to make parallels with the situation in The United States, we can refer to the TEA-21 or, the Transportation Equity Act, for the 21st Century. This program is actually pursuing the same objective, to promote intermodal transportation. What is remarkable, however, is that in contrast with the the European intermodal program, TEA-21 does not mention inland waterways whatsoever, and has very little impact on coastal ports as well.

Soon the re-authorization of the TEA-21 will begin. I believe that conclusions of this conference should be brought to the attention of our decision makers that inland waterways, short sea shipping and coastal ports are very much elements of our intermodal system.

This concludes my introduction to two panels, which are about to begin; one is on transportation planning, and another is on environmental impacts. Once again I fully expect that my European colleagues might challenge my admiration for their policy because obviously, they face many problems of their own. Let us, however, try to compare big pictures. Thank you for your attention.

Panel 1 Introduction

By Mr. Joseph H. Pyne, President, Kirby Corporation

Thank you, Anatoly. I think you've framed the morning panel very well. Good morning to everybody. And let me add my welcome to the 100th Anniversary of the U.S. Section of PIANC. We hope to have an interesting and important discussion today about national and regional transportation plans as they relate to the developing economies around the world.

As Anatoly noted, there are some substantial differences between our U.S. approach, and the approach of our friends in Western Europe. We will explore these differences today, discuss the formulation of maritime transportation plans in the U.S. and in Western Europe, and look at the role of Federal and local governments, and private industry in financing waterway systems around the world.

We have an outstanding panel to accomplish this task. Ms. Doris Bautch, the Chief, Office of Ports and Domestic Shipping for the Maritime Administration will discuss the formulation of U.S. Maritime Transportation policies and how the inland and coastal waterway system relates to other transportation systems in the United States.

Ms. Karin De Schepper, Secretary General, Inland Navigation Europe, will do the same for the European Union. And Mr. Jeff High, Director of Waterway Management for the U.S. Coast Guard will touch on the role of Federal and local government as well as private industry in financing waterways in the United States. But perhaps even more interesting, he will talk about waterway capacity and the development of maritime transportation plans in the U.S.

As we're here today listening to this panel and other panels which will present today, both the United States and Western Europe are in the process of re-evaluating their policies and strategies with respect to their national transportation systems.

In the United States this re-evaluation is being conducted under the framework of the Maritime Transportation System, MTS, with the objective -- at least we hope with the objective of integrating water transportation, both inland water transportation and coastal transportation into overall multi-modal transportation, which includes rail and trucking.

In Western Europe, the European community has a similar objective for setting priorities for the development of various modes of transportation called the Trans-European Network, TEN.

As we noted earlier, the U.S. and Western Europe's approach to defining strategy in many instances is very different. In Europe there appears to be a greater emphasis on water transportation to deal with the difficult congestion and environmental problems caused by their mature infrastructures.

Europe has recognized that inland and coastal waterways have some distinct advantages with respect to capacity, safety, environmental enhancement, and protection.

In the U.S. our waterway system is for the most part not intermodal and not part of the overall transportation system. We look at it as an independent system.

We've not focused on waterway transportation as a solution to congestion, safety, and environment to the extent that Western Europe has. And in some instances our waterway system is seen as environmentally destructive, not an enhancement to overall environmental quality.

This should be a fascinating discussion today, and I encourage you as Dr. Hochstein also encouraged you to challenge this panel after they finish their presentations to explain the merits of their respective policies and strategies.

U.S. Maritime Transportation

By Ms. Doris Bautch, Maritime Administration, U.S. Department of Transportation

Thank you and good morning. I'm really pinch hitting for Chuck Raymond who is the President and CEO of CSX Line, and Chair of the Marine Transportation System National Advisory Council. He wants to be with you today, and unfortunately has had to send his regrets. So, I hope that I can convey to you what it is the council is doing regarding the inland waterway system.

The inland waterway system in the United States is our first interstate and a model of national accomplishments and enterprise. To quote an attendee at the most recent meeting of the U.S. Grains Council, "the United States has the most developed and advanced waterway system in the world. Yet, while there are some difficulties, its efficiencies help provide a competitive edge for U.S. products around the world."

Waterborne shipping is vital to our nation's economy, security, and transportation. Domestic waterborne shipping in the United States today moves 14 percent of the national cargo tonnage for less than two percent of the national freight bill. Provides an estimated 124,000 direct jobs. Generates \$10 million dollars in annual freight revenue. It provides \$300 million dollars and \$55 million dollars in Federal and state tax revenues respectively.

We have many states that border the inland waterway transportation system. 84 percent of U.S. grain production is represented, 60 percent of the agricultural jobs, 80 percent of the farms, and 62 percent of U.S. grains export earnings.

And now what I'd like to do is to update you on our plans, the Department of Transportation's plans to develop our last under utilized natural resource, the nation's waterway system.

Not since Dwight Eisenhower envisioned the national highway system over a half a century ago has such an aggressive and coordinated effort been undertaken to examine and improve one segment of America's overall transportation system.

In the past, our nation's transportation planners, policy makers, and the American public typically ignored our waterway system. I am here today to tell you that this is changing. There is a real focus today within the administration and in Congress on the inherent advantages of water transportation. The focus is on the role our waterway system can play, and the solution to our nation's highway and rail congestion problem, and ultimate development of our economy.

The nation's share of international trade is expected to at least double by the year 2020. Imagine what that increase will do to our existing overall freight transportation system.

A very interesting map, isn't it? That map shows you the domestic traffic flow in the United States. In many instances, the U.S. transportation system is already stressed to the limit. You can tell that, can't you? And the infrastructure improvements may not be able to meet the escalating trade demands.

As a result, the need for reliable transportation alternatives has never been more imperative. And even if sufficient financial resources were available to expand the existing highway transportation system, the lag time between demand and expansion is significant.

As a result, transportation planners have reached an inescapable realization. We cannot build ourselves out of the impending trade explosion. Viable transportation alternatives must be found quickly to avoid capacity crunch.

But as we all know very well, that alternative already exists. And it's represented in the room today, inland water transport.

Our Marine Transportation System offers a cost effective, efficient, and environmentally safe mode of passenger and freight delivery.

In fact, American transportation planners now realize that the smartest, cheapest, and safest solution to reducing truck and rail traffic is an additional coordinated investment in our Marine Transportation System.

As trade and surface transportation grows so too will the cost to the economy in lost productivity. And as transportation agencies in the private sector focus more attention to waterside options, the Federal government and maritime stakeholders have begun to look at ways to eliminate barriers, too, or create potential incentives for the development of complementary means of moving people and freight.

The U.S. Department of Transportation more than three years ago recognized that the growth of trade and industry, rail, and highway traffic was inevitable. And that government and industry needed to respond.

The Secretary of Transportation directed my agency, the U.S. Maritime Administration, and the U.S. Coast Guard to fulfill a mechanism to identify and recommend water based solutions to transportation planning and system needs.

Anatoly Hochstein briefly mentioned the Marine Transportation System. As a first step, two permanent national organizations were established. The MTS Advisory Council, which is sponsored by the Maritime Administration or MARAD, and a Federal interagency committee on the MTS, which is chaired by the Coast Guard.

The National Advisory Council consists of 30 members all from industry. They are not government agencies. The ICMTS or Interagency Committee is the government entity, and these two work together. They work jointly.

Today the Marine System Stakeholder National Advisory Council has six teams working to reach consensus on priorities, increase public awareness, and establish a coordinated public/private agreement on a smart growth action plan for our national waterway system.

As a first step in producing the plan, the council took a proactive step. Last December they delivered to the Secretary of Transportation a White Paper entitled "U.S. Economic Growth and the Marine Transportation System."

This White Paper and other action items that the council has taken are being used to guide the Bush administration, Congressional leaders, and maritime stakeholders in their choices about the future of the system.

One of the recent activities of the council is a review of industry user fees. Again, you heard Anatoly Hochstein mention user fees. We have a harbor maintenance tax, and we have an inland waterway user fee.

We want to see how these monies can be spent for the purposes for which they were collected. These purposes include the deepening and maintaining of authorized channels, and the construction of new locks and dams on our waterway system.

On a parallel track, the Federal Interagency Committee was formed to complement the work of the Council. It provides a coordinated government-wide response to the needs of the MTS. And you'll be hearing a little more about that from Jeff High from the Coast Guard who is my fellow panel member.

I should also point out that the national council and the Federal committee work with public and private organizations at the local, state, and regional levels to elevate the importance of economic effectiveness and efficiency of the waterway system.

If you look at the coordinating structure, you see that we do have the two committees that deal directly with the Secretary of Transportation. Below that we have regional entities, and below that we have local groups.

So, the information is fed up through these various entities. The work is coordinated so it is not hierarchical even though it might look like a hierarchical system. It is definitely a coordinating mechanism, and we're working very, very closely with the Office of the Secretary.

And the Secretary of Transportation, Secretary Mineta, has challenged the Council to develop the element of a National Marine Transportation Strategic Policy.

The Secretary views marine transportation as part of a cooperative effort to maximize choice and provide a logical transportation alternative to an impending transportation overload.

A partnership of asphalt, rail, and water is necessary for America's economic and national security.

As this chart shows, our nation's marine transportation system provides enormous economic impacts. Unfortunately in many instances, it has been an invisible transportation mode.

Many Americans, unless they live in communities alongside the coast or alongside the inland waterway system simply don't see the effects it has on the economy in their daily lives.

When you take a look at this, it supports two and a half billion Americans. Contributes \$65 million dollars to our economy, and the numbers go on and on and on.

The freight moves through increasingly congested ports on increasingly congested highways to their final destination.

Whenever I'm asked to speak about waterborne transportation, I try to discuss projects that exhibit real potential for economic growth.

And one of those I'd like to mention this morning is an initiative underway at the Port of New York and New Jersey. By this time next year, one or more locations in the port inland distribution network, a system of satellite facilities for the New York, New Jersey container terminals will be on-line.

The port authority has completed a feasibility study for a program to expand port facilities in a cramped harbor in an environment for growing international trade. And what are they going to do? They're going to feed containers to remote locations directly by barge, thereby alleviating congestion at the Jersey container terminals and on regional highways.

Once this inland network becomes fully utilized, it will have extensive ramifications both regionally and globally. Dwell times at terminals will decrease. It now takes five or six days to get a container out of New Jersey at a New Jersey yard.

It will take one or two days by barge and represents a barge based logistics change that offers cost effective safe shipping options and builds our economy.

The inland distribution network is only one example of the benefits of our inland waterway system. Although Mr. Izzo stated many of these benefits last night, I would like to state them again because I think they're very, very important.

A single 1,500 ton barge, the kind typically used on our inland waterways can carry the equivalent of 15 jumbo rail cars, rail hoppers or 58 large trucks. An ocean going barge can carry 400 truck trailers.

Waterborne transportation as all of us know is the most economical on a ton mile and TEU mile basis. On a per container basis vessels are less polluting. These are all things that we all know and understand, those of us who are working in the industry. We know that the safety record of water transportation is unmatched by any other mode.

MARAD is partnering with the Port of Pittsburgh on a cost sharing project to study the feasibility of a container on barge service that would serve Pittsburgh and Monterrey, Mexico. The service would include passage through the Monongahela River, Ohio, Mississippi, and on through the Gulf Intracoastal Waterway.

There is also renewed interest in many of the initiatives that make up the MTS. For example, increased reliance on the coastwise shipping will accomplish many of our transportation objectives.

In the past it was felt that inland waterways and coastwise shipping were too slow and costly to compete with rail and truck. But now with increased congestion, higher energy costs, safety concerns and new transportation technology, waterborne transportation is becoming more attractive to shippers and transportation planners.

In order to be a catalyst, MARAD is sponsoring the National Ports and Waterways Institute of the University of New Orleans to conduct an evaluation and market application of coastwise vessels to benefit American domestic shipping.

The new coastal shipping solution will expand the overall carrying capacity, and efficiency of the domestic transportation system, provide American shippers and transportation intermediaries the broadest possible range of transportation options.

They will complement the given resources of the region and provide an outlet for

an extensive inland waterway network that feeds into the Gulf of Mexico.

It will increase manufacturing and service opportunities for American factories, shipyards, ports, and the vessels, and river and coastwise service.

We have come to a stark realization in this country. Our national highway and rail systems will not be able to build their way out of the impending trade explosion.

Water. Water offers the natural and inexpensive solution to the problem. A solution so simple that it almost boggles the mind. And that is where the MTS initiative really comes into play.

The MTS initiative is about local issues with international significance. It's not just another government program conceived in Washington and run by Washington. It was built from the grass roots up, has local underpinnings and is in response to local concerns.

Washington will continue to expand the MTS initiative by working with planning organizations, shippers, ports, U.S. and international vessel operators, labor, shipyards, and all of the most optimized service options for American businesses and the traveling public.

In closing I would like to leave you with these thoughts. Our Marine Transportation System efforts in the U.S. are in many ways our first baby steps. Isn't that sad that we have to say that in the year 2002 to building and utilizing our nation's waterway system to its maximum capacity?

We look forward to continuing our working relationship with all of you to develop the most modern and advanced transportation system in the world. Thank you.

Inland and Coastal Waterways in Transportation Plans of the European Union and Member States

By Ms. Karin de Schepper, Secretary-General, Inland Navigation Europe (INE)

Dear Chairman, dear Colonel Clapp, dear Dr. Anatoly Hochstein, dear Mr. Joseph Pyne, dear ladies and gentlemen, it's really a great pleasure to be here today, and I'll introduce you today to the European Union's policy on waterways and coastal shipping.

And I hope we have afterwards a bit of discussion because for me it's a great occasion to learn more from your system. But let's just return to this presentation.

So, first I will introduce the organization I work for, and a bit about the situation on inland waterway transport and short sea shipping. Then I will speak about the policy of the European Union and the member states. And last will be additional positive incentives to promote waterways.

Inland Navigation Europe, what is it? It is a platform which has been set up quite recently, and it consists of national promotion agencies for shipping. Those national European agencies don't exist in every country of Europe. Some countries decided ten years ago that something needed to be done for the promotion of inland waterways because all the images were outdated. Also, there was no awareness at all. So, it's not only in the United States that we are experiencing problems.

So, those national member states like the Netherlands and Belgium, Germany, France, and offshore, they said well, we have to set up a special agency to promote "the market", but also "policy making" to use more inland shipping. Now, of course, you have to do it through the market, and these agencies have been able in the last ten years to change radically the image of inland shipping, which is very important. We've seen it in the growth and also in the investments in waterways in Europe. But we still aren't where we would like to be.

And that's why those national promotion agencies set up a platform where they could exchange their experiences and see what they could do together to the European market. And also to the European Institution because they are ever more important in Europe. You can't just base your policy towards the "national policy makers". It's INE Europe that decides about individual matters.

Now, what is the objective of Inland Navigation Europe? We want to ship more cargo. Now, we see it as a challenge because we see that today the situation is a very big mess. It is all congested. It is not very organized. We don't want to be the richest state. That's not our solution, but we certainly can optimize services to do away with congestion and to make our society a bit more environmentally friendly. So, that's how

we would like to look at it in let's say ten, twenty years in the two last images.

Now here are some figures, but again very surely it's more illustrative. So, you see that the overall share of inland shipping in Europe is quite small. It's only 6.8 percent. But you see that in some member states with the infrastructure there, they are very successful. So, that's important; when the infrastructure is there, inland waterway transport is very clearly an option.

You see also that seaports of the European Union are important. The modal share of inland waterway transport is increasing. So where it was only a small part some years ago, we see that now in Antwerp it has gone up to 31 percent. And in Notre-Dame it is even higher. And, of course, our aim is to get it even higher.

Now this is just for your information, the kind of vessels we have in Europe, some pictures. Our convoys are a lot smaller than yours here. Container vessels are one of the bigger ones currently .

And then also a bit about short sea shipping. You see immediately that short sea shipping seems to be more successful than inland waterway transport. Of course, you have also fewer barriers in short sea shipping than you have in inland waterway transport. The infrastructure is there. When you talk with people busy in the sector, they are not quite sure about the figures because, in fact, this is the figure of the European Commission, but the European Commission didn't make clear the source.

So, we can say that 41 percent is the intra-maritime trade. But it's not very clear what it's based on. So, it counts mostly for figuring of container traffic to European boats. Now as I said, the reach is much bigger than for inland waterway transport.

What we've tried also to develop in the following years is not only short sea shipping to the seaports, but to go with sea river shipping right away to the inland ports and to bring directly, without any trans shipment in the sea ports, maritime traffic to inland.

Inland waterway transport unfortunately has some intrinsic weaknesses. The network is limited. You have still some missing links. Our infrastructure has some problems. We have locks that are just too narrow, bridges that are too low. So to have good profitability and a lot of layers of containers, this is still not possible on all rivers.

Some rivers we can only navigate with two layers. We go now for three. Some are bigger, with four layers. But if you are only working with two layers, that's a bad thing for your profitability and which we would like to see improved in the following years. And that's not really a big infrastructure investment.

Of course, another disadvantage is that in intermodal transport with waterway shipping, you always need a trans shipment. And that, of course, builds up costs, and that's a problem. So, you need to be competitive on other things. But we know that once

on board, shipping is the cheapest way to transport.

Now, we have the environmental impacts in Europe, just as you have. We have a lot of difficulty making clear to the citizens that inland waterway transport is indeed very environmentally friendly. Citizens think that it is not because they think, "This is coming in my back yard, and I don't want it." They think about digging new things and this is, of course, damaging immediately to the environment.

But you know that you have to look at the environmental balance. How many trucks do you take off the roads. Because this is the last environment for balance you have to look at, and not at the incidental intervention you have to do at a certain spot. This will always be there, and this will always be a problem.

But, of course, techniques are there today to keep damage as limited as possible and to respect the existing diversity. And we see, for example, that the first stretch of the main Danube Canal in Germany that was co-financed by the European Investment Bank, was clearly a canal.

But if you go just farther on, on the last part of the main Danube Canal, you might wonder is this a canal, or is this a river. And you can see that it is a new canal. So techniques are now up-to-date to deal with that. It's very important from our side also to communicate it, and to show that development of waterways can be done in an environmentally friendly way.

Of course, some advantages, and that's not different from the USA. So, there I can be very short. There is a basic network in spite of the missing links, in spite of some bottlenecks, but we hope to eliminate the bottlenecks. The missing links, of course, are more difficult and will take more time and more power to convince policy makers.

There is also a very helpful growing integration of information technology. And I'm very happy that our organization Inland Navigation Europe is working together with PIANC to communicate this to the European institutions and to see what we can do at an overall level to find good standardized options for information technology in Europe.

And, of course, not to forget, there are a lot of economic barriers to the waterways, because waterways are not only for transport, they are there for a lot more. And we know that if transport brings a lot of economical value to our own economy, it's also true for recreation.

And we must not forget that if locks were not there, there would be much more

flooding. So, there are a lot of things that the citizens are unaware of, and which they should be informed more about so that they really understand the advantages of inland navigation.

So the market situation is very short. And I think that some growth will be coming. Of course, it's very vital for important ports in the European Union that they don't have congestion.

So, therefore, you need some inland terminals, some backup areas for the inland network to relieve congestion at those seaports so that trucks, rail, and inland navigation can move freely.

And it's, of course, certainly a problem for trucks. And then when you have more than distribution and the gathering function of inland navigation with terminals, then you really can take a lot of trucks from the roads. And that's what we are trying to do within the modal traffic, which is really flourishing.

There we now have to act on short distance. Because if we want to grow, we have to do it on intermodal transport. We have to do it there where road transport is very strong. And that's also where we have a difficulty to convince. And you will only be able to convince people with concrete marketing examples. For example, road transport really thinks and the European Commission thinks as well that inland navigation is not performing on short distance. Well, this is wrong.

You have very high performing terminals, which are working with legs of 50 kilometers. So this is very short work, and they are very competitive. I know terminals that really after five years of working have now a problem with capacity.

There is a new world to explore also for new cargo. In containers you can put everything. So we know also that our furniture and our fortunes can be in containers. So, everything can be transported. Of course, no fresh goods, no flowers, that's clear.

But also, a new branch in our country is waste. A lot of waste is transported on the roads, and we know from studies that a lot of these waste disposal sites are only about ten kilometers off the waterway. So, it would be a simple exercise to bring them close to the waterway and to transport them by waterway. And this is also a project which is carried out in Belgium to bring 60 percent of waste on the waterways.

So here you see that we can't do everything with waterway transport in Europe, but we can reach the same important base. The red spots are, of course, the road distribution areas, and we want to keep them in the future more limited, so that the rest is done by rail or by short sea shipping and, of course, by inland waterway transport.

And when we just combine two waterborne transport modes, we can do a lot. We can reach almost all Europe, all kinds of destinations, and that's where we're heading.

Now, the EU member states policy. In the '90s it was already a great challenge on the former commissioner for sustainable mobility. But when they were talking about each mode of transport, it was only road and rail. Inland transport, inland waterway transport was not in the picture, not at all.

The discussion of internalization of external costs. To be honest, this is a discussion that started in the '60s. Because the discussion is so difficult, we are still talking about it. And I have to say it might be good if the discussion came to an end, but we are certainly not that far today. So I'm afraid, Anatoly Hochstein, we have great plans, but I don't know when we'll have realization.

Now, in 2001 we had a very important communication of the council, the Council of Ministers. The Prime Minister, who is head of the state of the European Union, said we have to do something about sustainable mobility, and also to include inland waterway transport in this sustainable mobility policy.

In September, the White Paper on Transport was published. And, yes, I can explain to you why it's called a White Paper. This is typical European terminology. Green Paper is always before a White Paper, but there are some exceptional cases. A Green Paper in Europe, in the European Union at least, is a paper with which the European Commission is opening the discussion, but there is no plan. So, it's really a communication where they go to the European Parliament, to the Council of Ministers, and to the industry and to the citizens to consult; these are our ideas, these are results of studies, what are your ideas. So, it's opening a discussion and debate.

A White Paper, however, comes after this Green Paper. It's after that the commission has gathered all this information of different sectors and from the Council of Ministers and the European Parliament that they again communicate on the situation, but they add a plan to it, a plan of concrete measures. So, it's a step ahead. And this is this White Paper for 2010. The commission makes an analysis of the situation but adds 60 possible measures to reach the goal they would like to achieve for 2010.

Of course, this is still a discussion paper. It is now discussed in the European Parliament. It is discussed also in the Council of Ministers. And we are, of course, also participating in the discussion with our contacts in the European Union.

Very clearly, as Anatoly Hochstein said already, we want to have sustainable environmentally friendly mobility. And for the European Union this is very important because Europe wants to define itself as Europe of the citizens.

Still, the European Commission has difficulty to make clear to the citizens that they are representing all of Europe. A lot of European citizens feel that the European Commission is very far away, and that Brussels is deciding everything.

So they really have to take account of the citizens' concerns. So therefore sustainable environmentally friendly mobility is a very important part of the White Paper.

Of course, you have businesses which must remain flourishing. So it's important to maintain for Europe a competitive business environment. And, therefore, in the plan we have to try to maintain also the idea that we don't come up with measures which afterwards would damage the business in Europe.

Now, when the European Commission looks at the transport situation, it's quite difficult. Because as you see the model split for road transport is 74 percent and more. In the land transport picture, road transport has 75 percent. But if you add the sea transport, the maritime trade, it is 44 percent with 41 percent for intra-European maritime trade, and the remaining figures for rail and inland waterways.

We know that freight transport demands will increase from 38 percent. This we'll be sure, and even perhaps more. We know also that short sea shipping and inland waterway transport is growing, but in this case it's not absorbing the transport growth.

So we need additional measures, and that's the justification. When we look at the congestion problem, we know from studies that 70 percent of the undertakings are experiencing problems with their transport; that they are facing congestion. That tanks are not arriving just-in-time, which normally is the first task of road transport. And we're also proud of just-in-time delivery.

And this, in 70 percent of the cases, seems to be a problem. 10 percent of the Trans-European Network road corridors are congested. 20 percent of the rail corridors. And when we have to look at pollution, 84 percent of the O₂ emissions are due to road transport. So, these are all reasons to look for a more viable and environmentally friendly society.

The Trans-European Network. As always in a system of the European Union, the European Commission makes a proposal, and then it's up to the member states and the European Parliament to decide about it. And the member states decide if they finance or they don't finance and implement the plan.

Now, the idea of the Trans-European Network comes after the treaty of 1992 to re-create social and regional cohesion overall in Europe so that you could easily reach also the center and the outer parts of Europe.

So, also we need to go beyond a patchwork of national plans. Because if you look at the maps of the European Union, you see that, in fact, the national member states have their national plans, concentrated on their country, on their transport flow.

There was an example, for instance, with Spain and Portugal where you see that all the highways in Spain went from the north to the south, but they didn't go to west Portugal. So in this case, it was very important that there was a European plan where we came to a kind of European transport infrastructure. And not only national transport

plans, but interconnecting also to modally. So then you can be more efficient with intermodal transport, because it's difficult to create a modality if you don't have a link from the rail to the road and from the road to the water.

Now, the horizon of 2002 is certainly idealistic. If we look at the rules that exist, we have two important rules. You have the investment guidelines, the criteria which really determine which kind of projects can get co-financed. And you have, of course, the financial rules; what kind of financing can be given.

Now for the investment guidance, you have the priority projects, which are mainly big rail, some airports, and big road corridors. Now, in the proposal of the European Commission in September, 2001, there is for the first time a waterway corridor.

In the priority projects, there will be the idea to upgrade the connection between the main Danube Canal around Strasbourg which is the south of Germany where navigation is difficult throughout all the year. Now, this is a proposal. We are very happy with the proposal, but we don't know how far it will go. After the elections, things could be different.

Then we have also the growing environmental concerns. If you want to carry out projects, you have to do now for each project a strategic environmental assessment. So, there is much pressure of the director general within the commission following the development of transport projects. And in this proposal of the European Commission, they said we have to look at the potential negative impacts of waterway development.

We didn't find that for road. We didn't find that for rail, but it was there for waterways, and we were very surprised. But the pressure as you see is very high.

Now for each project you have also to take into account the directives for biodiversity, and then we have the tools like the habitat directive, small birds directive, and now water framework directive.

Financing. The available budget is \$4.17 billion in the 2000 - 2006 period. The MIP stands for the Multi-Inland Program. And there you see that \$2.7 billion is available for 2006. When you count this together, TEN-T (TEN for Trans-European Network, T for transport), the regional funds and the cohesive funds you come up to \$18 billion in Europe.

And for ISPA, and this is for, in fact, the important transport corridors in Eastern Europe for the accession countries who will be joining Europe soon, there is one billion extra Euro per year, and they have a very high level of co-financing. It's up to 8.5.

Now, if we look at the financial allocation, you see that 75 percent goes to the Multi-Inland Program and 50 percent to the priority projects. So, it's very important to be in the priority projects. It's very important that we get more waterway projects in there. 20 percent to the Galileo, which is certainly familiar to you, our new system for satellite

navigation. And 30 percent for rail, trucks, border, and other projects. And they'll manage to fit in some waterway projects.

25 percent of the overall budget is for annual projects, and these are allocated each year. So, it's very difficult to give you information. There you have to lobby each year to get in, but it goes all the way to the national member states. So, if your project has been cancelled by the national member states, you never get at the European level. So, this is a difficult exercise.

Rail has priority. The European Parliament has determined in the '90s that rail development should be the most important one in the Trans-European Network. And it should be at least 50 percent. In reality it's 65.

For each project you can have from the European Commission 10 percent co-financing. The other part is for the national member states. And now for a study it's more; it's 60 percent.

Now in the new proposal of September, it should go up to 20 percent for any rail project, but it's mostly, in fact, intended for the big rail projects for the Transalpine where we have the mountains. So where it's more expensive to go through there, it's intended to have more co-financing, and for other projects, but only when they are cross border with the new accession countries. If they are in France or they're in Belgium or in the Netherlands, no 20 percent. It's only when you have the Germany with let's say the Czech Republic or Poland, but not in the European countries.

Now, we see which money went to the inland water transportation, it's two percent of the Multi-Annual Program. So, it's quite low and 7.5 in the annual projects. And for the eastern countries, there was nothing in the period of 2000, 2001.

I remember that there was one project in 1999 for the development of a Hungarian inland port. But these last years, there are no waterway projects for the eastern countries.

Now, we see that there is a lot of rail development for the eastern countries, and it's very surprising. Because we see from the statistics that their network is much more dense. It's six times as dense as it is in the European Union. So, it's quite strange.

Of course, there will be a lot of road development, but that's normal because they have fewer roads than we have in the European Union. But to come up with some figures we have a road network, and it's a bit similar to the figures we gave Doris for the United States roads, but 50,000 kilometers in 1999, and for rail 154,000 kilometers. So, this gives you an idea of the density and figures for inland navigation, which you will find back in the slides.

So, this is for the Trans-European Network. Just for your information here you see very clearly a map. So with the most important waterway corridors in the European Union, you see also Finland is in the top, which is linked to our system with short sea

shipping. This could be also the case, but it's not on the map with countries like Spain and Portugal and so on.

But the European Commission really still thinks in traditional terms in its navigation. Most of the traffic is concentrated in those countries which you see on the map, but we have to think of course in the future, and it's important to take all potentials in mind.

The red dots were, in fact, the plans which were agreed by the member states, but some plans already have been abandoned. So this one has been abandoned. So this is an important north/south corridor, which is in the drawer.

Now, we will have an overall revision for infrastructure in 2004, because then we will have the first accession countries coming in. What is important there is that we now go to the European Institution and ask that we have waterways of sea, and that they put this forth in the White Paper. They don't have to develop it from the sea ports, but inland.

So you have to start, of course, with a quality net. We're starting in inland ports, and not in seaports. You have to really have this intermodal approach of having everything included. We want also more nondiscrimination between modes because we see that there is not a wide balance for financing. And that you really look there when you are allocating your financial needs; you are looking after all at mobility effects. And not just in terms of allocating to certain modes, but what will be the effects and the impact.

And yet, of course, you need to do more about the integration of information technology. The European Commission is very active for road, rail, and maritime, even for air transport where they really assist with rules, with standards, the optimization and integration of information technologies.

We see that up till now for inland waterways, it's only at a state of research and there is technology available. So more could be done there.

Then a very interesting proposal from the European Commission, with which we are very happy, is the Marco Polo Proposal.

Now we had before the Marco Polo, we had the PACT Proposal. And the objective of the PACT Program was, in fact, take away transport from the roads by rail, by short sea shipping, by inland transports, but only for containers. So, it was limited in scope.

Now, the PACT Program brought some big projects, and we see also in the evaluation of the program that the inland waterway transport programs were very successful. So now with the new program, the commission tried to learn from this PACT Program. They said well, we will grow to continue this kind of program, but we will open it to all kinds of traffic. So not only containers, but any innovative thing which you

can come up with; for railroads, for new cargo, for pallets. It, in fact, can be eligible under PACT, but it should be a service.

Marco Polo is not intended to finance infrastructure. It's possible for a certain project that it can be optimized, but it's not the idea that it should finance infrastructure. It should really finance, co-financing; giving a kicker for the service, the new service that will be set up.

Now, you have several types of services that can be co-financed, and this is like the modal ship action, and there you can get \$1 million co-financing, \$1 million Euro. And this is at 30 percent of the overall project.

So, there you really have to try to shift cargo. It might be just bulk, but there must be new shipment. You also have the novelty action, the catalyst action as the commission calls them. And there you can get \$3 million Euro. So quite a lot of money over a period of four years to set up a new service, but there it's 35 percent. So, it's even more co-financing, but it must always be, and that's normally in the European community, you need to set up a cross border. So, it can be within France or within the Netherlands. It should be taking more states together, at least two member states or one member state and one accession country should be in the game.

The commission also wants a special action to disseminate results because we learned that from PACT there were a lot of very nice projects, but no one knew about them. They weren't happening in Spain or in Finland, and no one knew about it, so there was no education. So, now they want more dissemination of results so that markets can follow best practices from other market segments.

Now, what we think is important to promote for inland waterways is that there is good access for small and medium size enterprises. The inland navigation sector is in European Union mostly a business for small and medium size. You have very big players, but you have also a lot of SMEs.

And when you are talking about this big amount, for them it's very difficult to set up a project. So, there we think it would be better to work with smaller projects, but we

have to look again for the effects. So, the modal shifts, what do you attain in the end?

We have also national state aid programs where the commission, because the commission is who authorizes national aid, can say well, member states under this condition. So no distortion of competition. It must be necessary and also it should be an economically viable project. It is possible that member states allocate money to -- it might be a port, it might be an operator for infrastructure, but also for services, also for training.

So, this is possible that every time you have an idea, then national member states have to inform the European Commission about it.

Now, just very quickly about Marco Polo again. So, this will be the way of counting. So in this way, the European Commission will calculate how much money you will get per project. So, it's really important to see how many ton kilometers will be saving one Euro of external costs. It will be based on the external cost savings. So, that's an important issue.

And another important criteria is the savings per thousand kilometers, ton kilometers in Europe again. And there you see that in inland waterway transport and coastal shipping is very well placed and even better than rail transport to bring into a project.

Now, again the Marco Polo is a proposal. So we hope that it gets adopted, but we will see what the European Parliament and council will have to say about it.

Now, we go to this other hot issue of charging and pricing. And as I have said, it is a discussion that has been going on since the '60s. And it's very difficult to come to a solution. We have been discussing it for years and years, and we really don't know in what form we should put it. We had Green Papers, we had White Papers, and we are now waiting. A new communication, which they don't dare to call it anymore White Paper because we had it already, and afterwards we will have a directive.

Now what is, of course, the underlying problem? It's the limited resources for

infrastructure because, of course, we know that the public sector is not in a position to finance all new infrastructure. So, it's also a means to finance this kind of infrastructure. And, of course, in the first instance, the environmental aspects.

Now, if you look to the current situation of the European waterways, and Anatoly Hochstein referred to it, the Rhine Dams are free from navigation rights. Other waterways have navigation rights, but they have been used very heavily in the last years to make inland waterway transport more competitive. And this was, in fact, a very positive step of national member states to promote inland navigation.

You have, of course, the port use. That's normal. Lock fees in some situations and not enough. It depends very much on the country so that you see again in the European Union, you don't have one system, you have a lot of systems living together.

And, of course, for waste treatment also you have to pay. And in northern countries like Finland and Sweden you have also to pay for pilotage.

Now, what is the idea? They want the European Commission, and the ideal thought in the White Paper wants to charge the user for the infrastructure and include also the internal costs.

And, of course, the idea of the principle is normal. Everyone will agree with it, the user pays. That sounds normal. And, of course, you have to reflect the real prices in society, not just the price of the operation.

The discussion from the '60s was always concentrated on the road sector and it still is. There's a lot of research evidence on the road sector and more we have also on the rail sector. But when you look at the maritime sector and the inland waterway sector and even how do you deal with the intermodal segment, there is no evidence at all. And if we ask questions to researchers and eminent professors, we don't get a clear answer.

So, even within the working group of the European Commission, you have a clash between different units. How can we deal with it when there is no clear evidence? There is only for roads and rail.

And roads very logically said we don't want to pay for it alone. If it's adopted, it should be for everyone and not only for our sector. Of course, there are now some national examples; countries that said well, anyway we will start with road pricing. So a good example is Germany, also Sweden.

And then also next to this charging system, the commission also wants

harmonized taxation for fuel, because there is also a huge difference between member states. And there is also a proposal for taxes by energy use.

Now as I said, there is enormous resistance from the industry, and that will require discussion again. And the roads said very clearly we are already more expensive than our colleagues in the U.S., and if we have to become even more expensive, we are not a player anymore. This is, of course, a very sensitive issue.

For waterways you have, of course, also the multifunctional use. How do you feel with this kind of thing because it's not only transport, but what do you do with the other functions? Does transport have to pay for it all, or just a part of it?

Summing up. So in the White Paper if you look for specific measures for inland waterway transport, the European Commission is thinking of standardization of technical requirements, harmonization of boat master certificates.

So, you see all very functional measures again, not really intermodal. Intermodal is coming again in the Trans-European Network and the Marco Polo.

For short sea shipping you see it's a bit different. They also want to take away barriers like customer administration and documentary procedures, type and safety rules because we have had some major tragedies in our European waters.

Also, developing a European traffic management system. There they are farther than they are for inland waterway transport. They will also revise the state aid guidelines, which is a very important thing and which we don't have for inland waterways. We don't have clear rules; they have expired. We only have a treaty to look up. And then, of course, the Trans-European Network and the Marco Polo also for short sea shipping.

So what we'd like to see if we want to promote more waterways is what the European Commission member states and the European Parliament will do. There is work being done for the Trans-European Network. So there we want them to address more the infrastructure of bottlenecks, but work is being done. Also for the software, we

are in positive discussions. Marco Polo is a very positive step, but we think more can be done.

In fact, we regret that Marco Polo is only for servicing. We think it's very important that you consider also the linking infrastructure. You need your access to your waterways.

So, there we see that from the industry there is a lot of interest to invest, but they want some kick-up from the public sector.

We also want national member states with their experts to get a review from the commission and the industry, to talk to each other about administrative bottlenecks. It's, of course, very difficult if you have to stop in the north of Flanders because you can't navigate on the weekend. You can in the south of the Belgium, but you can't do it in the north of Belgium. This is a kind of very curious thing. Just sitting together it could be solved, and they think that member states and the industry and the European Commission can learn from each other without very heavy legislative measures.

And, of course, we have to raise awareness, but that's a job we have to all do together. Thank you.

U.S. Marine Transportation System

By Mr. Jeffrey P. High, Director of Waterways Management, United States Coast Guard

Good morning everyone. Thanks for the opportunity to be here. I'm going to talk to you a little bit about the Marine Transportation System. Normally my challenge is I have more to tell you than I have time, and I really understand the challenge today.

So, I will skip over more things in this briefing than I normally would. The advantage you have is I put a lot of things in the slides, and so you will have them as your take away in the proceedings. I'm going to talk about the Marine Transportation System with an overlay of waterway capacity.

I'm going to get to some of the issues on policy that Dr. Hochstein asked us to address. And, last, I'm going to talk a little bit about financing issues on behalf of Carl Bentzel, who by the way was going to be part of this panel and sends his apologies.

I talked to him on Monday. He told me four times to please let you know that he is sorry that he couldn't be here. I said, "okay, Carl, give me your top two points," and you'll get them from me with a little bit of interpretation.

My theme on waterway capacity is going to be published in a PIANC report, actually coauthored by me and Lieutenant Alan Blume sitting back there. Alan should get all the credit. So, Alan, I'm going to tell them a little bit about what we were looking at.

Waterway capacity. We've said basically in the United States we don't have a plan for figuring out what it is or how to measure it. We do little things, and certainly the Corps has some measures of the stuff that flows on our waterways. But we looked at it, and we said there is no single way to define a waterway. Certainly, you can consider waterways as links between points of production and points of consumption. We've heard a lot about that from Karin. And there are different users of the waterway.

If you look at the highway system, for example, primary roads, secondary roads, that kind of a model, there are different kinds of waterways. So part of our paper will tell you a little bit about that.

We considered different ways of looking at capacity. One is sort of a dimensional analysis. How big is it? What can fit in it? Like ships and things going through it. Ships domain theory says if you have a ship this big, it needs a little bit more space because it's got to turn. How much goes through that channel, or throughput, is another measure of capacity. These are things that are important to us.

Our whole idea is that you need to have a definition that's flexible, that is

scaleable, and that's for all the waterway users. That's not just the commercial, it's recreational and so forth. And it must be easy to understand.

Actually our bottom line is that there are lots of things to learn out there. You can benchmark creatively. Some of the European and Asian countries are ahead of us. We can learn from them.

You could also learn from other modes. Highway planners have been considering capacity issues for 50 years. We talked to them and asked what we could learn from them. So, there you have a little bit of capacity as an overlay.

I'm going to tell you now about some of the things that are going on in the Marine Transportation System. First, what is the Marine Transportation System? It includes the waterways, the ports, and their intermodal connections.

Those of you who know John Pisani, may know he was my partner on this when we started this effort four years ago. I'm now working with Doris, Bob, and others in MARAD. One of the pieces I've underlined here is that MTS is intermodal. It's a very important part, and it's also a sub-system of the big full transportation system. That was one of the doctor's points. We're part of a system. We're not just a mode in and of ourselves.

So, our effort has been to figure out how do we fit it all together. Why are we doing it? Well, you've heard a lot about that from Doris and from Mr. Izzo yesterday. We need to support an expected growth in traffic and for a full range of users. So, this is why we went into the MTS. And I'm going to show you a little bit about what we've been doing.

My slides are my notes. You'll see lots of reasons that we are concerned about our national economy and security, and marine transportation contributes to it. You've heard some of the same statistics over the past couple of days, so I'm going to pass through those quickly.

Challenges. We have this growth in population. That's the world population, by the way. And the world is getting more affluent, and they want to use our goods and services, and we want to sell our goods and services, and that drives our growing economy.

That's going to double or triple the trade that's coming to and from our country and moving around within it. Clearly the size and speed of ships and our need to deploy our forces overseas are issues.

And certainly we have capacity and condition issues. You heard about that from the Corps before, and you'll hear more about that probably later today. So these are some issues, some challenges that we have.

Our MTS history. It started about four years ago. The Secretary of Transportation said, "I will be the advocate for the Marine Transportation System." We went out, and we did listening sessions around the country. We talked, and we asked "what are your issues?" We had a national conference that followed up on those issues and wrote a report to Congress. The report was prepared by a task force. As Doris said, this was a public and private sector partnership. The national report was written by about 65 members, two-thirds of which were private sector.

So, we've been out there talking to folks. We did regional dialogue sessions next. We went back to the same places where we started and said "here's what we've been doing for you for a couple of years. What do you think now?"

And then we've had a number of sessions on harbor safety committees. That's the local level version of what we're doing. Doris talked about it in her diagram. I'll show you the diagram, too. We've had four national conferences on that. We are talking about how to learn and benchmark from one another.

I told you it's a full partnership effort. This slide shows some of the Federal agencies. I'm sorry for the alphabet soup, but the Corps of Engineers, Coast Guard, MARAD, EPA, NOAA, and a number of transportation agencies; customs, agriculture, and so forth. They're all partners in this effort. We now have 18 agencies that are very active in our process.

This is our vision statement, and it is just a very short statement. We have six principles that go along with it, and seven pages of additional description of what really we think the vision should be and by 2020. People always like to count the adjectives--there's nine, and I'll save you the trouble. I've underlined a couple here. The adjectives efficient, effective, accessible, globally competitive, and dynamic, all deal with capacity. Safety, security, and environmentally responsible are adjectives that reflect missions that have been there for a long time, but we've added the others. They're capacity issues, and there are ways to move our traffic around it.

Look at that grid that Doris showed you. The highway system is congested. We need to find a way to contribute. And again, Anatoly, there it is again. It's part of a system. We've got to remember that.

And when we started this, we talked about it being part of the National Transportation System, but folks we also have figured out it's part of the International Transportation System. In our report to Congress September of '99 we identified seven areas, strategic areas of action, and they are listed here. The check marks show you the ones where we've been most active. We've been dealing with coordination a lot. That's from our listening sessions we are told the most important thing is that the Federal government folks don't coordinate. By the way, the private sector folks don't coordinate either, but we need coordination. So, we've been working on that.

We've been working on awareness. We've heard a lot about this in the last few

hours and days. the public isn't aware of the value of our Marine Transportation System. We're working on that, and I'll show you some of that in a second. And then certainly most recently security has been a big, big issue. That's another topic for another day. Here's that same picture that Doris showed you on the different agencies. I'll just let you know that there is a public sector group. That's the ICMTS, Interagency Committee on Marine Transportation System. That's the Federal group. And then the group that Doris talked about, the MTS National Advisory Council. That's the private sector and non-Federal. And then we have local and regional, and we've talked about that.

Within the Federal sector group, this is sort of a picture of some of our standing committees, and you can see there are six of them. I've listed there the chairs and the vice-chairs of those committees. If you look down at the top four or five, you'll see there's seven different agencies taking a leadership role in these subcommittees. Again, we've got 18 Federal agencies involved. A lot of them are taking a leadership role.

The Steering Committee looks at all of these and tries to wrap them together to make sure that we are aligned. We're looking also at this awareness issue--how do we make the importance of our system known to the world? So, that's one of the things we're doing. And we're going to also be working on our strategic planning as well.

This slide shows some of the things that we're doing in the Steering Committee. We've done a number of different exhibits and so forth. We've taken Congressional staffers on tours of waterways. We've developed a logo. We're putting together a message. We're working on a video right now. To tell you the truth, we were filming some of it last week in St. Louis. We had the president of the America Grain Owners of North America, who is also a farmer.

He was talking about how getting the grain from his farm to the barge costs him more to truck than it does to barge it all the way from St. Louis to New Orleans. That gives you an idea of the value that he places on the Marine Transportation System.

The Steering Committee also is working with Congressional Affairs working groups to make this more visible in Congress. And you can see some of the things we're doing. Lots of support for each other's hearings. I've testified on behalf of NOAA, for example. We have a very interested senator. That's Senator Breaux. He believes this is a national issue. He was planning a series of hearings last fall, and those actually turned into hearings on port security. But he planned to go out and do hearings on MTS, and he still is interested.

The 22nd of May this year we're going to have a reception on Capitol Hill for the members of Congress and their staffs, and Senator Breaux is going to sponsor that. And he's planning potentially a hearing the day before or that day as well.

We have a number of other activities. I'm not going to go through these in the interest of time. They will be in the proceedings. You can see we have a lot of things going on. There's one in the middle I will tell you about, though.

The DOT working groups on the reauthorization of the Transportation Equity Act of 21, that's TEA-21. I am a member of the group within the Department of Transportation that's looking at that re-authorization. It is very focused on the surface mode. We have modes that are surface, and we have modes that are maritime, and they do not mix.

My pitch whenever I go to those meetings is “don't forget the maritime, don't forget the maritime.” The point I'm making this year is that as we re-authorize, although we may not be ready to buy into this system yet with maritime money, we ought to be looking at how do we work on the maritime in the future. What kind of joint planning do we have? How do we do the kinds of things that Europe is looking at in terms of the total system?

So, I'm trying to make that point. There are other things going on. I will just let you know we talk about public and private sector financing. The U.S. Chamber of Commerce has put up some of their own money for a 14-month study. I want to say it's probably a half million dollars or more of their money.

They've hired John Vickerman from Trans Systems to do this study. There's a blue ribbon panel made up of Federal members. I'm on it, MARAD is on it, Customs is on it, plus some other Federal members. We have trucking and rail involved, and they're very much looking at intermodal things. That's industry money looking at this problem of industry links.

And we're looking at SEA-21 policy papers. If we ever get a maritime version that's equivalent to the TEA-21, we want to be able to talk to the secretary; here's the kinds of things that you ought to be looking at. We now have a list of about 40 items, very specific things that we need to do to improve the maritime system, and part of that is linking to the TEA-21 .

Here are some of the issues. Again, you'll see them in the proceedings. That's just a listing of some of the topics that we are looking at under our interagency group. We're going to provide these to the Secretary of Transportation.

I told you I'd weave in capacity. I think in the interest of time, I'm just going to let you know that we have worked with the Marine Board and got a conference together to talk about what we mean by capacity and how we would measure it. That happened in April, but we've got more work to do.

The next thing is that Congress will come to us and say “okay, I buy your story. You need stuff for the Marine Transportation System. What do you need?” We don't have the answer today. The Corps has some pretty good answers on dredging and locks and dams and those kinds of things. But in terms of the total Marine Transportation System, we don't have all the answers. We're going to get something from the Chamber of Commerce study, I believe. We've looked at a study on energy transportation if we

can get some funding to do that probably through the Marine Board. We'll have some answers there.

And we're looking at other ways to assess our MTS needs. That's sort of the first step. We have a number of challenges. They center around awareness. We need people to know why the Marine Transportation System is so important. That's the public and the Congress. We have a number of specifics that I've mentioned already, and we need to tie somehow into this TEA-21 planning process.

Our funding processes for TEA-21. That's another story. If anybody wants to ask me, I've got some ideas on where the billions of dollars are. I think there is some money for marine transportation, and that's the way we're going to buy the SEA-21 .

Okay, I'm going to close with this slide. On behalf of Carl Bentzel, I asked him, "Okay, Carl, what are your main points?" He said, "First of all, Senator Breaux is very interested in this, and he's taking sort of a two-phase approach."

The first phase is, what are the numbers? What are the issues out there? He's looking at various modes. He said, for example, let's look at the difference between the amount of money that's collected for the highways and the surface modes, and the amount of money that is spent on that. And how much is collected in the airways, and how much is spent on air? And how much is collected and generated by the maritime, and how much of that is spent?

He's commissioned a GAO study to look at that. They're going to get their first briefing on the 24th of April. Their findings are basically this, a hundred percent of the surface transportation money collected goes into surface transportation. A hundred percent of the air goes into air. 20 to 25 percent of the money collected from the maritime goes into maritime issues. That's Senator Breaux's main theme. He's ready to put it on a placard and go down on the floor of the Senate and talk about it. That's a good thing for maritime.

Phase II is how do we maximize on that system? In other words, again what's the answer? When we say okay, we've got to take that other 75 percent and collect it and put it into maritime, what are you going to do with it?

And therein lies the issues of the study that we've got going on and some possible legislation and funding. Senator Breaux is looking at how he can help. I've talked to Carl Bentzel about some of the studies, and I've told him we need money for the studies. And he said, "I think I can help you with that." And he's going to try and work that.

Here is the bottom line. Carl Bentzel's name and phone number are on the slide. Now, this is what happens when you don't show up; people give out your phone number. But actually Carl said I could do that. In fact, he encouraged me to do so. He apologized again many times for not being able to be here. And he did say if anyone has any ideas on how we should determine the needs for the maritime system, or how we should spend

the money, feel free to call him because he's probably going to be the guy writing the legislation. I apologize for going so quickly, but I'm finished now. Thank you very much.

Panel 1 Discussion

MR. PYNE: Thank you. Thank you, Jeff. We're going to take a few minutes for questions. Tom, we're going to just steal maybe ten, fifteen minutes if we could. So we'll entertain questions or comments to the panel. If you would please state your name.

MS. JOHNNCK: Yes, I'm Ellen Johnck. I'm Executive Director of the San Francisco Bay Planning Coalition, San Francisco, California representing maritime interests in the bay.

I'm very interested in Anatoly's challenge on looking at the approach to the environment, comparing Europe to the United States and environmental issues on waterways. And particularly I'd like some comments from the panelists on the validity of Anatoly's statement, thinking that it seems as if there is more acceptability of the waterways in Europe and the perception that development on waterways is not degrading to the environment.

Whereas, in the United States there is a very anti-development approach and attitude on the waterways. Everything we do on the waterways is perceived as anti-environment. We're always trying to defend and get ahead of that curve. So, number one some comments on that idea.

Then secondarily I am interested in knowing what the approaches are to handling environmental issues on waterway projects. Particularly, we seem to be very much on a sound science approach in the United States, looking at how we can better defend our activities on the waterways showing we really don't have as adverse an affect as some people think, and that we are trying to develop better sound science on impacts on the fish, et cetera.

The other approach is to look at more of an environmental risk, showing the environmental effects, you know, overall. For instance, if we are in effect reducing congestion on highways and air pollution mitigation there.

Sort of different approaches and the way to help us deal with the environment and further improving our efforts to elevate the importance of the waterways, and what we can do to be successful on them. Thank you.

MR. PYNE: Yes, thank you for those questions. I think with respect to the second question, that's a better question to pose to the second panel that's going to address environmental issues. But with respect to the first, the Anatoly challenge, who would like to start?

MS. DE SCHEPPER: So for environmental, waterway development, and environmental effects what we have here is a very diverse analysis of the situation.

For example, in a typical waterborne country like the Netherlands or Belgium, you don't have a negative approach to waterway development. The negative approach is seen in other countries where they are not used to big waterway development projects.

And there what we clearly need to do is to communicate and also to coordinate

more together. So, first to communicate, to say what we are doing and what kind of impact it has because now we are reactive. So that's as well happening in Europe.

Also, we have to coordinate because everyone is doing something in their national member state and even in their region. And it is very important that we sit together and learn with each other. And we see, for example, that where British waterways has been working with the World Wildlife Fund, they have been very successful. So, these kinds of measures of working together, opening the dialogue with the environmental groups is very important. Thank you.

MR. HIGH: May I just say, from the U.S. perspective, obviously we've included the environmental stakeholders as much as we can in our MTS efforts. That's very difficult because they are very diverse, encompassing many, many different views. So, we're working with them, and we're trying to figure out a way to get their views more implemented. And EPA is a strong member of our team, by the way, so they're trying to help us with that.

I'll just give you a little anecdote. Here's part of the problem we have. I was talking about the benefits, the air emission benefits that Anatoly was talking about of the marine mode.

And one of my colleagues who is I would say a highway background person said, oh, no, but you ought to see the report that was done by the Transportation System Center. I haven't seen it yet.

But the way he related to me was it says that marine diesel is much worse than highway traffic. And, in fact, there is no benefit. I was flabbergasted.

But the point is there's a perception out there that it isn't as wonderful as you think. So, we've got to get our hands on those reports. We've got to defeat those kinds of comments, and we've got to do studies ourselves to be able to show that we have the

benefits that we claim.

MS. BAUTCH: I'd like to ride in on what Jeff had to say, and the fact that we tried to include the environmental organizations in the National Advisory Council.

But additionally MARAD has always been very, very supportive of the inland waterway system. And several years ago we did develop an excellent brochure talking about the environmental advantages of inland waterway transportation.

So, if you'd like to download it, you can get it on our web site, www.MARAD.gov. And that will help you as you go out and you continue to talk about the environmental advantages of inland waterway transport, you have some statistics there. You have a nice brochure that explains, and you can use it as you get to talk to others. Thank you.

DR. HOCHSTEIN: Let me just hit at that. I think the situation is that we have attacked the situation with an expedient approach. On one hand it's very clear that we are the most friendly to the environment. On the other hand, we see that we have huge opposition from the mainstream environmental groups.

And I think, and that by the way goes for both continents, the same situation. Therefore, we need to really understand the roots of this huge misunderstanding and possibly counterattack it by creating environmental groups who work with us who may deliver our message in more environmental circles. And I think that the MTS does a lot to bring it in, of course, working with the EPA.

MR. PYNE: Is there another question?

MR. RUSSO: My name is Edmond Russo. I work in the New Orleans District Corps of Engineers. I just wanted to give you a perspective. I'm an operations manager of several shallow and deep draft projects in the New Orleans area. I also worked in planning and project management and have looked at this issue.

It seems that this is a foremost subject in the transportation industry. There needs to be a national study done to examine the market trends and see where the traffic needs to go; what types of traffic and where it needs to go in the United States.

Look at what our existing capacities are and where the bottlenecks are with regard to water side and land side connections and focus our studies programmatically with environmental impact assessments to authorize and fund projects for this kind of development.

This is probably one of the only ways that we're going to see meaningful and comprehensive progress on a noticeable time scale. It seems that, when you're working at the district level, maybe you don't see some of these things.

But perhaps that type of thing would be advantageous, especially to get everybody from the policy makers to the project executioners. That's the Corps of Engineers when it comes to water resources and development projects.

They all need to come together to make this happen. Right now it sort of seems splintered, and this would really help to really get the process going.

MR. PYNE: Thank you. Thank you for that comment. Does the panel want to respond to the need for a study?

MS. DE SCHEPPER: I could perhaps comment on that. I just wanted to say that you are very right. We have the same problem in the European Union. We don't have a very clear study, which is picturing the transport flows across the European Union. We

have port of water flows. We have some from company to company, but really door to door flows overall Europe we don't have. And so if you want to build up any efficient infrastructure, the appropriate infrastructure where your priorities are, this is very important. We've been asking for this quite some years, and we always get kind of a part of the study we want, but we don't get the overall picture.

So I don't know how it is in the U.S., but we are also asking that research money be spent for clear projects, and not money to this and money to that and to all kinds of little projects.

MR. PYNE: Do we have time for another question? Tom, do we have a little more time or -- one more question.

MR. BRUIN: My name is Dick Bruin. I'm from the Netherlands. I work at the Ministry of Public Works and Transport. I'm a river engineer. I did a lot of advisory work abroad on inland navigation. And I worked at the World Bank, in particular in a program on inland navigation and the environment.

And with that background, I want to make a remark and maybe ask a question. I enjoyed the presentations this morning, but I missed one crucial issue and that is maintenance. If you want to prove that a business is flourishing, then you must maintain that business.

So if you have infrastructure in this case, you're talking about inland navigation infrastructure. And if you want to prove that it works, then you have to maintain that system.

Now, in my organization in Holland, we spend more than 55 even 60 percent of the annual budget on maintenance. I'm not talking about new capital investments. I'm just talking about maintenance. And that is for let's say the maintenance of structures, but also the waterways, alignments, and so on. Of course, maintenance dredging also. And I missed also the maintenance aspect in the presentation from Brussels. Maybe you can say something about that because in my opinion it's mainly a matter of the member states, the maintenance of infrastructure, but you really have to work on that. If you don't maintain your business, then it will not succeed. And the time I lived in the United States in Washington, I traveled a lot also here in your beautiful country. But again and again as a European, I'm flabbergasted when I see the neglect of your infrastructure, and this is a crucial point. Maybe you can say something about that.

MR. PYNE: Thank you. Let's see. Was there a message that we didn't respond to the maintenance issue?

MR. HIGH: I'll respond to that. Clearly maintenance is part of the needs that we have identified. Obviously the Corps of Engineers is very good at understanding what needs to be done in terms of locks and dams in our waterways and so forth. I just didn't get into the details.

And as we determine our assessment of our needs for the future, what we need to do is make sure that that is one of the things that gets down on our list. Clearly it's

important, and I agree with you a hundred percent.

MS. BAUTCH: What I had indicated and again, perhaps just glossed over it, is the fact that we do have a legislative working group in the National Advisory Council. And we are looking at the uses of the harbor maintenance fee and the inland waterway user fees, and how those monies can be redirected for their purposes.

And one of those purposes is the maintenance of the channels and the locks and dams. And the Corps, of course, does an excellent job of that. But we are looking at that, and we will be making recommendations or the council will be making recommendations to the Secretary of Transportation as to how those funds can be re-allocated for the purposes for which they were established.

MR. PYNE: Thank you, Doris. Now, we're going to take one more.

MS. CAMBRIDGE: Joedy Cambridge, TRB and the Marine Board. Anatoly, I just had a response to the point that Mr. Russo made. I think we've done a lot of studies on the issues of capacity and where the bottlenecks are and where the greatest needs are.

One example is a TRB study that's about to be finished looking at freight capacity in the 21st century across all modes. That should be finished fairly soon.

The study being done for the chamber is looking at some of these issues. And there has been a lot of effort done within the Federal Highway Administration under TEA-21 studies, including the intermodal connector study.

I think the frustration is that these bottlenecks and these issues have been identified and nothing has been done to correct them. And I think that's where the problem is.

I don't think we need a lot more studies on where the big constraints are. We just need now to have the funding to do something about it. And I think that's true across all modes.

MR. PYNE: Well, thank you for that comment. We're going to end with that comment.

Panel 2 Introduction

By Dr. Robert M. Engler, U.S. Army Corps of Engineers Research and Development Center

I'm Bob Engler. I've got the pleasure of hosting the second of several panel discussions. We're planning to answer all the environmental questions of Dr. Hochstein and those additional questions that were referred.

The title, Comparative Assessment of Environmental Impacts elicits a wide range of issues. We are pleased to have an esteemed panel representing the public sector, government, and international views. And I will introduce each one separately at their time to speak.

My role in PIANC is the Chairman of PIANC's International Environmental Commission. And my real job is Senior Scientist for Environmental, for the Army Corps of Engineers. I am located at the Waterways Experiment Station in Vicksburg.

Assistant Secretary, Tom Wakeman who you met yesterday, Tom is the dredging czar for the Port of New York and New Jersey.

MR. WAKEMAN: You know what they did to all the czars, don't you?

MR. ENGLER: Back to our subject area. Water resource managers, users, and regulators we work under a huge array of local, national, regional environmental rules many among countries. Moreover, there are and global laws, regulations, criteria, and standards that more often than not conflict with one another.

That is to say each set of laws and regs protect their medium (land versus aquatics versus the atmosphere) and often do not give any consideration to the medium they're not protecting.

We as water resource managers also use the land. Yet, we're constrained to do things on the land. When we use the water, we're constrained. When we use the atmosphere we're constrained.

The goal of this session is to look at these environmental constraints in a comparative sense.

As was described in the previous session, we're fully convinced as to how important water resource transportation is.

Ecological and Safety Advantages of Water Transportation in Comparison with Other Modes of Transportation

By Mr. Eric Van den Eede, President, International Navigation Association

It's a pleasure to be here in Vicksburg again. And indeed I'm wearing my usual two hats, the PIANC hat and the hat of the Division of the Ministry back in Belgium.

I will try to be as brief as possible. Last year at our AGA meeting, Annual General Assembly, in London we approved the policy statement. And you see here part of our mission statement where we indeed claim to become the international forum for analysis and discussion of all aspects of waterborne transport, safety, and environment; the two topics we are dealing with today.

Also, a couple of our strategic goals are related to inland navigation. We have a special commission for inland navigation, which is called INCOM, to make it simple. And just a couple of weeks ago, most of you, or at least the PIANC members amongst you, received the report of Working Group 24 which deals with vessel traffic systems and river information services, one of the new developments. EDI, Electronic Data Interchange, becomes more and more important in the management of inland navigation, and particularly related to the safety aspects of it.

As Ms. De Schepper pointed out, there is close cooperation being executed between PIANC and the European Union. And as a matter of fact, this particular working group report was presented at the relevant directorate general of EU and was very well received.

Normally, PIANC working groups have only a limited period of time to produce the report, and then they are discontinued. In this case, this working group will be commissioned to review and update on an annual basis the findings and the evolution in this particular field. The members of this working group are in their countries the individuals responsible for this matter, so they are in a good position to take care of this objective.

This is a typical example of how PIANC members doing their normal job at the same time can serve the international community with a PIANC hat upon their heads.

Other reports that are under preparation, and that will be published later this year deal with the safety of inland navigation and with sustainable river management. Actually the chairman of this working group works here in Vicksburg. That's Mr. Craig Fischenich.

You have listed here all the effects that should be considered when comparing the different modes of transport. I picked some graphs from a dedicated website in Europe related to inland navigation, but I guess most of you are familiar with those figures. So, I don't think it's useful to go into any details.

But specifically, for densely populated continents like Western Europe, perhaps these are relevant figures when you compare the land use you need for the same transport capacity. And if you put road at 100, you see that inland navigation needs just 10 percent of the space to be able to transport the same amount of goods.

Also, very remarkable both the French and the German governments commissioned studies to make comparisons between the social costs of road and inland navigation, and you see the results are nearly the same. It's a factor of about 14 times more social impacts related to road transport than to inland navigation.

Now, another aspect, and perhaps the title is a bit confusing, but I put ecological threats in this respect that I want to give a warning that we are sometimes too self confident. And you know the first session was a typical example. We consider inland navigation as the safest and the most environmentally friendly mode.

But the problem is that the general public, and in particular the decision makers are not always aware of that or don't agree at all. So, we should be proactive and able to better market the product of inland navigation. And we should do it in a practical way, already coming up with solutions for questions that will inevitably be raised.

I listed some here. Destruction or loss of habitat especially in Europe, but also here in the U.S. Whenever there's a new project of inland navigation, of course, you have to put it somewhere so it consumes land. It might create loss of habitat, then you have to compensate this loss, et cetera. Splitting up of landscapes, disturbance of ecological systems, risk of pollution caused by accidents.

Then shifting to safety aspects. Everyone agrees navigation is by far the safest mode of transport. And there are far less accidents per ton kilometer than by any other mode. But I put here a little simple formula. Risk as a product of frequency and impact.

Let me explain it in a simple way. When there's a truck loaded with dangerous goods, and there's a collision or an accident, let's say it might impact the next block.

If a river, a main waterway which normally passes through the center of major cities has the same goods in a much higher quantity, then there is a collision, it's not just the next block, but perhaps the whole of the center of the city which might be destroyed.

Of course, my point is the frequency of accidents is let's say negligible. But if something happens, the impact might be much bigger. So the risk in total, is hard to predict in advance.

A number of countries, for example, the Netherlands, but other countries are following, are establishing contours, lines of maximum risk that can be tolerated. If then the center of a city lies within the boundaries of a risk, this might have as a consequence that navigation would be more strictly regulated, for example, not allowing the crossing of two vessels within the limits of the city.

Perhaps this might for some of you seem a bit far-fetched, but I think we should be aware of these kinds of problems and also be aware that the solutions to deal with these problems are already available. For example, these river information services and vessel traffic systems are a tool to better monitor the movements of our inland navigation vessels.

Lets look at safety threats. Indeed one of the particular problems now in Europe is that the increase in inland navigation entails more ship movements and more chance of accidents. Also the 'just-in-time' concept might create hazards. We have developed a number of inland navigation terminals for containers. So, it's obvious when those vessels need to be in the port at a given time because a sea going vessel is going to leave at a certain hour, they should be there, or otherwise they are having a big problem. So, I don't need to describe that this might result in neglecting safety and speed limitations.

Also, the scarcity of skilled personnel. Recently our waterborne police has undertaken an action to identify the crew members on the vessels. Because, due to the lack of personnel on the market, illegal or certainly not fully qualified, sailors from Eastern European countries are working on inland navigation vessels. And these are not always familiar with all the safety precautions.

Another potential threat is the unskilled recreational boaters which appear everywhere and which not only endanger themselves, but also the commercial navigation.

Within the EU a difficult discussion is going on regarding the internalization of external costs. There are four approaches, and they are dependent indeed on both nation and time.

Let me tell you a little story. A couple of years ago together with our French

colleagues, we were undertaking an economical study about the liaison between the Seine and Scheldt river basins, corresponding with the Paris region and the Belgian and Dutch North Sea ports.

We need to discuss in the Steering Committee a number of boundary conditions within a time frame until 2010. The idea was that by then due to the efforts the European Union has undertaken that about 50 percent of the external costs should be internalized by road pricing and all kinds of other measures. But our French colleagues disapproved, and they told us this would be totally and politically impossible in France. So, we had two scenarios. One that in France, Germany, Holland, and Belgium we would have 50 percent of internalization.

But the more realistic scenario was that indeed Germany, Belgium, and Holland would have this 50 percent. But in France only 15 because they feared that if the French government would undertake such measures, the truckers would block all the highways and the economy would come to a standstill.

A couple of weeks after we made this decision, the French government increased the fuel tax. And all of a sudden and probably you remember this, for a couple of weeks the truckers indeed totally blocked the French economy. So, this was indeed a very good judgment of our French colleagues at that time. This proves that it won't be easy to implement a system of road pricing.

Marketing. Indeed a magic word. Yesterday I told General Griffin that indeed we engineers have two major problems. We are too modest, and then at the same time, we fail to market. And his response was a very extrovert engineer is the one who looks at the shoes of his opponent during his discussions.

So, I want to conclude with PIANC's role because indeed I'm convinced that PIANC plays an important role in this process. First of all, of course, by producing useful information, and by participating in the transfer of information.

Environmental Advantages as a Factor in Prioritization of Water Transportation Projects

By Mr. Joseph R. Wilson, Operations Division, U.S. Army Corps of Engineers,
Headquarters

Thank you, Bob. I want to thank the U.S. Section of PIANC for inviting me to speak. Before I get started, I want to relate to you a story that I hope will convey a message that I hear as a recurring theme. And the message is illustrated by my wife's herb garden.

Last year we bought a farm, and my wife is intent in jumping right in and starting to farm her herbs. And so she's really digging this cooking thing, and she plants several dozen herbs. And I told her, "Sweetie, be careful". I said, "We have lots and lots of deer out here in the country, and they're going to come back in the fall, and they'll just graze these things down."

And she said, "No, no, no, these sweet little deer are not going to eat my herbs." She said, "I planted herbs that repulse deer; things like sweet woodruff and other types of herbs that deer just don't eat."

And I said, "Honey, I'm telling you when deer get hungry in the fall, they eat anything green." And so she says, "No, I won't worry about it." And so all summer she plants herbs all over the rocks and the formations and things that we have in the yard.

And low and behold, sure enough, in October the deer come back, and they just mow her herbs right down to the nub. You can't even recognize them; it's bare ground down there.

And so my wife comes to me and she says, "I just can't believe this." She goes into the barn, and comes back out with my rifle and she says, "How do you shoot this thing? I'm going after Bambi."

And so it illustrates that it's our problem, and we're not doing a good job of communicating to the public that it's also their problem. It's a failure that we have. I think it's a failure in the United States and perhaps other countries, too.

We're doing a better job. We're experimenting with some things. The Corps of Engineers is going to launch, in fact, a new web site on educational outreach. I think that's going to be a good thing. It's targeted towards kindergarten through twelfth grade.

We hopefully will have it on the Corps's main web site, and you'll see it. It's really good. It's interactive, but it's a step, and we've got to keep working at it. We're not doing as good a job as we can in educating the public that our problem is also their problem.

So, let me get right into my presentation. I wanted to do three things. I wanted to take you through history because I think it's important to understand how we got to where we are in the United States with regard to environmental legislation.

I want to give you a non-economist's view. I mean I'm not an economist, but the reality is environmental legislation changes the complexity of navigation projects. It changes the outcome that the engineers perceive and the planners perceive in these navigation projects.

And finally, I want to look at some issues that are emerging now and look into the future to get some sense about where we may be going in the United States and perhaps the world.

First of all, it's good news and bad news. The bad news, perhaps, is that I've had to say on the one hand that environmental legislation in the United States has definitely put the navigation transportation system at an economic disadvantage.

There's no doubt in my mind that when you look at historically how we viewed navigation and its importance to the U.S. economy in the early part of the last century and even in the 1800's versus the last thirty or so years in the United States, you'll see a dramatic shift.

But on the other hand I would underscore the fact that in the United States environmental legislation has had a very profound effect on how we have shaped environmental issues. It's had a profound affect on our environment in general, and specifically projects around the country. Not just navigation projects, but projects in general.

First of all, environmental legislation is not new in the United States. It goes all the way back to the Antiquities Act of 1906, which is the first one I can come up with. And then there are acts like the Fish and Wildlife Act.

And again, I won't bore you with these. I teach environmental law for graduate law students at George Washington University. And we also have a Corps training course, and I teach that as well. And it's gotten to the point that the students complain that I get ad nauseam in all these laws because there's dozens and dozens and dozens of

them. And you can pick any law and find a way in some respects to either slow down or stop the project.

But I do want to emphasize that it's been an evolution. And the evolution had a big kickstart back in the '70s. And then there's a state issue that I want to talk about just briefly.

So, why did the environment matter and why did it change? When you look back at the '60s, you'll see some serious hurricanes that occurred in the late '50s and early '60s. And I think the catalyst which really made the big difference, that catapulted Congress into doing something, was the Cuyahoga River in Ohio catching on fire. I mean we're talking about serious pollution here.

And when you look at that river today, it's a marked example of how we have improved the environment. That river now is fishable, drinkable, and swimmable, as mandated under the Clean Water Act.

So, what are the advantages? Well, we began to realize in the '70s that environmental benefits don't just benefit the environment; they also benefit humans. And I think it's an important feature that we need to keep in mind that when we were in the '70s we were thinking more like we had the engineers on the one side and the environmentalists on the other. And we said, well, engineers create things for the economy. We get jobs, we get all these other things.

And then the environmentalists were sort of defending themselves. And so the idea was well, wait a minute. You know there are fishermen out there. There are people that use the waterways and water resources for recreation, and there were hunters, and the ducks, and other things. So all that had an impact as well.

Well, as we started developing projects in the mid to late '70s, the environmental issues became actual tests for whether projects proceeded or not. You couldn't build a project, for example, that had irreparable harm. And any and every project that had a significant impact on the quality of the human environment went through a very vigorous process to ensure that project considered the environment in the decision making before the ultimate construction of the project.

Well, did economics fairly factor in environmental costs? I think they did. I think we were trying to come up with some balancing act at the time. We were in the '70s discovering what is the environment worth. If you look at some of these CEQ reports back in the '70s, and I'm one of the few people that probably keep and read those, there were several issues that Congress was looking at.

They were looking at things like trying to assign some sort of value, economic

value to things that hadn't before had economic value assigned to them, like wetlands. We knew they were important, but how important were they?

And so we started looking at assigning value. The courts were looking at other things. They were looking at things like 'taking' issues. We have the Federal government now regulating activities and waters in the United States.

And, in fact, we were 'taking' private property. And so the courts were looking at that; the CEQ was looking at that. So, there were some emerging issues there that sort of shaped how we began to think in the '80s.

And then, of course, the '80s came in. And we all remember the Reaganomics theories, and that's sort of an issue that comes along with O and D and other economic factors that were playing up into the '80s. And the idea was, let's assign a value to everything. Everything had a price. Everything had some sort of economic value assigned to it. Whether it was an accurate one or not with regards to the environment, it really didn't matter. I think it was a consensus approach that we adopted.

And, of course, the first water resources legislation in about fifteen years, the Water Resources Development Act in '86 had cost sharing, and then we were putting into that first piece of legislation, water resources legislation some environmental legislation as well. And we're adding environmental features to the projects.

We had local harbor deepening, for example. And the agreement was that the environmental groups would not support local harbor deepening unless we hauled all the maintenance material to the ocean. So, it was one of those environmental deals that came about at the time.

Again, in the '80s, equal status for the environment, and it carried through. Were the environmental features exceeding costs? I think yes, in some cases they were.

And, of course, then as I pointed out earlier in my presentation, the states were starting to feel their oats under the Coastal Zone Management Act and the Clean Water Act. And in those two pieces of legislation, Congress gave the states a partial waiver of Federal supremacy.

And, of course, in the United States we have a constitution, which protects the Federal government's right to do things in navigable waters. Ultimately, mitigation for fish and wildlife became the by words in trying to accomplish projects in the '80s.

Well, ultimately the idea was, let's put it in WRDA. Let's don't try to deal and negotiate with these issues beyond anything that we have to as far as when these projects are being developed. And so the idea was just, let's put it in the Water Resources Development Act, and that carried through in the early '90s. And in the early '90s, we began to get better at assigning economic value to environmental features.

And I think it came about because the economists, the engineers, and the biologists, and everyone that had a say started getting together with the realization that we have to start coming up with some sort of sense about how to best assign value. And then we agreed to things like the habitat evaluation procedures and other types of analysis.

Poplar Island is an example of a project that was great for the environment, but the economic costs were tremendous. I think that in the Poplar Island case, the wetlands were about \$50,000.00 per acre. Typically, in other places around the country we build wetlands for about 10 to \$12,000.00. So, it was a great project for the environment, wonderful engineering feat, but very expensive.

In the '90s again we carried through with trade-off analysis. Somebody loses, almost always somebody loses. And we came to the realization that not every project is supported by everybody. And so the by word became, let's negotiate. Let's figure out some way to get there from here.

Again, we're getting the engineers, the biologists, the economists. Everybody is coming together better in the '90s than they were in the early part of the '70s and certainly before the '60s.

I want to speak just a little bit about sustainable development. I think that one of the things that we keep talking about now is we want to do sustainable development and ecosystem management. I think one of the issues that I relate to in both of those terms is that, particularly with regard to ecosystem management, we're really about ecosystem planning right now. I don't think we're ready for ecosystem management.

Ecosystem management is that next generation of getting everybody together. With regards to sustainable development, I think it's a lot like ecosystem management, which is that we look at doing it on a long-term basis.

The problem with sustainable development and ecosystem management is that I'm not sure we're looking at the long-term costs of the ecological aspects of either sustainable development or ecosystem management.

We're good at looking at the engineering stuff on a long-term basis and quantifying the economics associated with benefits. And you start looking at the benefits of ecosystem improvement, are we looking at that on a long-term basis. Are we willing to make that commitment to spend resources on a long-term basis?

Okay. I'm going to spend just a minute on the next frontier as I see it. The Endangered Species Act, it's old law, new species. More and more species are being listed. Almost daily I see a new species being listed as endangered.

Some fundamental questions that we have to answer. We're asking them now, and we're going to have to ultimately answer them. We're not answering them yet. Is

this really a natural part of evolution? Does every species deserve total protection from extinction no matter the cost? The law says yes.

I'm not sure that the law in this day and time is accurate. The law is almost 25 years old now. I think we need to re-visit the Endangered Species Act and make some fundamental decisions about how we want to approach it in this century.

We have exotic species. International trade has brought all kinds of trade into the United States. We brought in zebra mussel. We brought in Chinese biden crab. We brought in all kinds of aquatic plants. It's the kind of trade we'd like to send back, but unfortunately we're having to live with it in the United States. It's creating a drain on our economy in some respects.

We're spending a couple billion dollars a year now, just dealing with exotic species. It's something that I foresee as a long-term issue that the United States is going to have to deal with, certainly the Corps of Engineers as well.

The Clean Air Act. I want to just briefly mention that. I added it in last night. That's why the slide is a little -- it's been modulated because I heard several speakers talk about it yesterday. There were some amendments about ten years ago to the Clean Air Act and EPA issued that regulation in '93. They're just now implementing those regulations. It's based on non-attainment areas. We know of several.

There's L. A., that's been dealing with Clean Air Act issues for a number of years. Houston is on the cooker now. You heard Tom Wakeman talk about New York yesterday. There are going to be some other regional locations put on the Clean Air Act non-attainment areas list.

To give you a typical example, a dredge, typical dredge, in about three days will exceed its air emissions in a non-attainment area. And so we're seriously going to be looking at electric dredges in some places around the country. It's going to change the entire complexion of the dredging industry.

And the dredging industry has not put this on their radar scope yet, it's a big issue. I really think they need to take a hard look at it. I'm dealing with it in headquarters for a couple of the ports now.

I think for the next 100 years, since it is the U.S. Section 100th Anniversary I'm obliged to at least give you my insights. Perhaps I'll be here, you probably won't be. But I've warned everyone that I'm going to die at my desk at work; that I'm not going anywhere for a long time. They'll probably just pickle me there or stuff me and just sit

me there and y'all come and see the old guy, he's still here.

But anyway we're going to have to hone in on this ecosystem management thing. It's an important issue. I think all of us already had several people, presenters that talked about it in previous conversations and discussions. We're going to have to deal with it. Right now we're going for good ecosystem planning, but then there's the implementation part. That's what's going to grab everybody by the ankles. We're going to have to go out and reach out to point and nonpoint source polluters; a very complex set of issues.

We're going to have states rights involved in it; going to have 'taking' issues involved in ecosystem management, a very important issue. And we're going to have more cost sharing. I think in the United States that if you want it, you're going to have to pay for it. I think the Federal government is going to be less inclined in the future to give those that benefit a free ride.

And we're going to have this renewable resources issue. I think when we look at it, we look at what's going on in the middle east right now. But when you start putting, a Cadillac in the hands of two billion Chinese, there's not going to be enough oil, we can't suck it out of the ground fast enough.

And we're going to have to figure out how in the United States we're going to deal with nonrenewable resources. And we're going to have to use research better. So, an important issue right now for me is that our researchers are doing incredibly good jobs at refining and fine-tuning the research.

We can look at things at part per quadrillion. And I want to see what one of those looks like, but I'm here to tell you that's tiny. But they assured me that they're accurate at it. I've talked with Dr. Bridges many times, and he's assured me that they know what part per quadrillion of an impact is. And I'm not disagreeing with them, I just hadn't seen it

yet.

But nevertheless the fact is we have all this information, but I don't think we're doing a very good job of integrating it into decision making. How do we do that?

Finally the last slide. Will balance prevail? I think that's the challenge for us, to look for a balance, how to strike some sort of balance between economics, environment, our engineering talents; bring all of it to bear.

And I had to throw in a little controversy here. Do we need deep draft harbors? Maybe we need more. I don't know. Are they in the right place? But I'm here to tell you environmental issues are going to drive the number, and I think to some degree the location of deep draft harbors in this country in the future. Anyway that concludes my presentation.

Public Perception of Comparative Environmental Impacts and Economic Preferences for Inland and Coastal Waterways and other Modes of Transportation

By Les Sutton, Kirby Corporation

You know there's an easy answer to these questions. And by the way, this topic was assigned to someone else. I'm pinch hitting, and we'll get to that later.

But I want to talk for a few minutes about the public's perception of comparative environmental impacts and economic preferences for inland and coastal waterways and other modes of transportation.

The fact is that there is almost no public perception of the comparative environmental impacts and economic preferences for waterway transportation. And you heard at least three of the panelists allude to that already. But there is almost no public perception of the environmental impacts. And that's why it's been so difficult for us to get our message across.

Why is there almost no public perception of the comparative impacts of waterway transportation? Look at where people live. Now, when this country was being founded, the waterways were the highways. They settled on the waterways. The book Lanterns on the Levee explains that during church if a steamboat whistled in Greenville, Mississippi, the men would get up and leave church to go down to the waterfront.

Where people live now, they rarely see the rivers. They are very unaware of water transportation. At the Gulf Intracoastal Waterway Association, we have a presentation called The Silent Giant. The waterways are silent because people rarely see them. That is because of where they work. How many people see waterway transportation to and from work? They certainly all see the trucks. They see the highways. And most of them see the railways, but they don't see waterways.

Another reason there is little public perception of waterways is what people worry about. How often does the average individual think about and worry about the relative costs or environmental impacts of water transportation?

So why don't people think about comparative environmental impacts and economic preferences for inland and coastal waterways and other modes of transportation? It just gets blotted out by everything else that's happening around us.

When we started the Waterways Work Campaign about a year ago, we

recognized that it was very difficult to get our message across, and so we hired Fleishman-Hillard to do a couple of studies to try to show us how we needed to deliver our message; what message would resonate with the public.

And one of those reports is a focus group, and then we had some interviews. They found it wasn't a top-of-the-mind subject to the typical voter. When asked to describe the inland waterway transportation system, the typical voter didn't mention transportation. And when you reminded them, they didn't think it needed any maintenance. Comments were: it's established, it's cheap, industries like it.

Again, there was very little public perception of navigation. When we reminded them of it, they agreed it was important, and what resonated with them was the history. And you've heard that when the nation was being founded waterways were key transportation arteries. Lewis and Clark and Huck Finn were important. History was important. Fewer trucks on the roads was important. Again, what affects them? Less pollution and less noise was important.

And surprisingly, we heard a lot in the first panel about intermodalism. It was important to them that inland waterways were an important part of the overall transportation system.

Another factor that makes it difficult for us to get our story across is adults only learn when they need to. It's very difficult to take a group of adults and give them a whole lot of information and have them absorb it if it doesn't affect them; if they don't see how it's going to affect them. They process information only when it's needed, and they want entertainment. They've worked hard all day; they're tired. The rule of the local news is if it bleeds, it leads. So entertainment, blood, sex, violence, scandal are the things that capture people's imagination.

The O.J. Simpson story had all of that. No story has captivated the American audience like O.J. Simpson because it had every one of those factors. Obviously, war is important because it has the blood and the violence, but also people think the war is or can be very important to them.

Now, our opponents understand how people learn. If you watch the attacks on the Corps and inland waterway transportation, they are always tied to events. It's very difficult for them to get an anti-waterway message out, just as it's difficult for us to get it out.

You remember the whistle blower who claimed the Corps had fudged the numbers in the Upper Mississippi study. When the whistle blower came out and talked about the bad thing the Corps was doing, they put on a full-court press. The whistle blower story was carried in about twenty papers nationwide from Washington, D.C. to Alaska. That didn't happen by accident. They were taking advantage of something that the people thought was important, i.e. the government is doing bad things.

The firing of Mike Parker was another. Again, it didn't last very long, but the environmentalists came right out with their anti-Corps message. I love a quotation by Scott Forbes of Environmental Defense. He said, "the firing of Mike Parker was the best thing to happen to the environment since God separated the heaven from the earth." Well, I don't know where he gets his theology. I don't think God separated the heaven from the earth. If he did, how could that be good for the environment?

American Rivers tries to create an image by annually releasing their ten most endangered rivers. And, of course, there is the Lewis and Clark celebration. Again, American Rivers wants to restore the Missouri River to something Lewis and Clark would recognize. The author that wrote the book about Lewis and Clark has given a million dollars from the proceeds of that book to restore the Missouri to something Lewis and Clark would recognize. I've always wanted to ask him if he wants to print his book on a printing press Guttenburg would recognize.

We do have a great story. Barges are efficient, barges are environmentally friendly, and barges relieve highway congestion. You've heard that. It's a simple story.

And maintaining a healthy viable inland waterway system is important. But the public doesn't perceive that. They just don't think about it. They have too many other things crowding it out. And that's a message we need to get across. So, we have to look at who is interested in the story: editorial boards sometimes, opinion leaders, inside the beltway, people in Congress and the administration who have to deal with the appropriations. They have to deal with authorization. So, you can get to them and their staff.

And by the way, on that Fleishman-Hillard research, we also included Congressional staffs. And they understood a little bit more about the waterways, if they dealt with it, but not a lot more.

So, we have to go to people that are important. When the story is effectively told, it's understood and accepted.

Last year after Craig Philip, one of the founders of Waterway Works, testified to the Committee on Transportation and Infrastructure, Representative Jim Duncan, the Chairman for the Water Resources Subcommittee said this, "given that water transportation is an efficient, effective, and environmentally responsible means of moving freight, we would be wise to make full use of our Maritime Transportation System". Now, friends, that's all we have to do is convince the public or the decision makers of that statement.

Barges do relieve highway congestion. A large tow on the Lower Mississippi carries the freight of 22,300 trucks. To move all domestic commerce in the U.S. by truck would require 41 million more truck trips, 9.9 billion gallons of additional fuel, and put 7.8 billion more pounds of pollutants in the air each year.

The good news is our opponent's story is not really resonating with the public either. I mean, we tend to think the grass is always greener. But I'm here today because Chris Brescia is meeting with an environmental group that has been opposing the expansion on the Upper Mississippi. They admitted two years ago that their real opposition wasn't anti-waterway. It was anti-farm. They didn't want more farming. They didn't want more run-off into the waters.

And in Tennessee, for years the environmentalists have opposed load-out facilities for logs. They're not opposed to load-out facilities for logs. They don't want the timber cut.

The Endangered Species Act has been used again and again against waterway development. They're not interested in protecting endangered species. They want to stop commercial use of the waterways.

So, the environmentalists on the Upper Mississippi are now trying a cooperative approach, and that's why Chris Brescia is meeting with them today. And I need to give credit to General Arnold who apparently explained it to them a couple of weeks ago.

Remember, adults learn only when they need to. Water transportation is not very important to them. We need to reach them with what is important, and that's highway congestion and clean air. And we need to influence the decision makers. Thank you very much.

Panel 2 Discussion

MR. ENGLER: Okay. Gang of adults, you've been challenged. These were very thought provoking commentaries. The floor is open. Ask some questions that they can't answer. Show that you have learned something.

MS. JOHNSON: Well, I guess I found myself asking why we think public perception is so important. I know because I spend a lot of my life trying to get waterway projects approved, and I know that public support is really important. But in the end when we're really asking for the support of Congressional leaders, of leadership on this, we're asking for incentives.

Because as a society right now, when we look at the economics of rail and truck, for instance, versus waterborne transportation, and when we're considering the social costs that Joe talked about, and the environmental costs that Joe talked about, we're only considering them theoretically.

And it seems to me that until those costs get transferred to the marketplace and we start seeing them in the marketplace, unless we can do that, we're never going to have substantial change.

And I'm wondering if the panel would like to address any of that because I'm just trying to make a connection between public perception and what do we want from the public's perception?

I would like to suggest we need public pressure for leadership to solve some of these problems, but they're not going to be solved just by public perception itself.

MR. SUTTON: Let me take a quick shot at that. Why we need to improve public perception is that our political leaders tell us they need it. I had one say he gets a thousand calls or letters from an environmentalist for every one he gets from a businessman. He said, hey fellows, I need some cover. I need some help. I believe in the waterways. I understand your story, but I need some help from back home."

MR. ENGLER: Any comments from the panel? Questions?

MR. WILSON: Let me add a little bit to that. I think you're right in this whole issue of perception. And over the past ten or so years, I've been challenged to some degree in headquarters from my previous bosses, chief of operations as it would be. And I've seen many of them over the years and probably will see a number more.

The idea is that we are not getting to the public, and so we've tried a number of approaches. And this latest approach we're looking at right now is targeted towards educational outreach.

And hopefully next week we'll launch this educational outreach site on the headquarters home link. So that when you bring up the headquarters home page, you'll see a link there that says "education center". And when you go into that, teachers and kids and whoever wants information can get it.

Now, what does that really mean? Well, what it means is that we're up here preaching to one another. We don't need to be preaching to one another. We need to be

talking to people at a very early age in their lives so they fundamentally understand that navigation is important and everything associated with navigation is important.

And so we've along those lines developed interactive games. There are crossword puzzles. There are science experiments. We've run this through the National Science Teachers' Association.

And so we've done a number of things to ground truth it to make sure it will reach the targeted audience, and that is kids through twelfth grade.

Now, we're going to get a lot of hits on this thing. And we're going to get a lot of requests for information, a lot of requests for speakers. And I just think it's the grass roots level that you've got to go to.

I don't think going to conferences and symposiums and different meetings where you have basically cheerleaders preaching to the cheerleaders and the decision makers that are already in support of your projects are going to make that difference that we really need fundamentally in the country.

And so that's why we've developed this navigation outreach, educational outreach web site. And I hope all of you have an opportunity to take a look at it. It's really exciting. I like it.

MR. VAN DEN EEDE: I also think we should get away from the idea that we just need to upgrade navigation on our rivers. As a matter of fact, a river and a canal is an asset that can serve multiple purpose, multiple functions. And I think we should try to get the idea through and even try to get the general public to the rivers not just to watch barges pass by, but to use the rivers and the waterways for recreational activities, whatever. So that when people are enjoying themselves along waterways or in these areas, they at the same time can see that indeed there is also navigation.

I fear that in our effort to push forward inland navigation, we are overemphasizing navigation and neglecting the other aspects. And I think the general public is even more interested in all those other aspects than in just navigation.

MR. ENGLER: There's a question over here. Ellen.

MS. JOHNNCK: Thank you. Ellen Johnck, San Francisco Bay Planning Coalition. To follow-up on my question to the earlier panel, Anatoly's challenge about how we really don't accept waterway transportation as an environmentally good thing. And anything we do on the waterway, except maybe sailing is a terrible impact. So, how are we getting around it?

I feel like as we talk about the environment with this subject matter today, we're having this quiver on our back and we're shooting arrows at this huge target. And I feel like we've got to look at this.

It's a layered topic. This global thing or more regional thing, yes, definitely we have to sell the environmental benefits of waterway transportation.

And I think you've laid out a good case for that and some ideas for that. No question we have to get out there and sell our story.

What I am grappling with on a day-to-day basis, though, is the very fact that we have projects that we are putting through on our waterways. We've got our dredging. We have our dock building, and we have our infrastructure or land site infrastructure that

we're building around intermodal concepts, and we can't get these through the permit process.

So, how do we do that on the environment? We can't get away by just saying oh, you know, our transport on waterways is definitely an environmentally good thing. You have to address the questions of impact right then and there.

And yesterday Todd came up with an idea of doing more of an environmental risk approach. We've talked about doing some more sound science.

Sye Simenstad from Oregon had some good ideas about actually getting some new science and some new understandings about life cycles of fish and how we can try to hit that head-on as being a real problem. Real or not, it's real because we can't get our projects through.

So, I guess I'm asking the panel to look at more of the day-to-day nitty-gritty environmental issues that we have to face and how we hit that, and what would be some approaches there?

MR. WILSON: Well, Ellen, let me say this about that. You can't run from regulators, you know. And sometimes you can't deal with them with science. I mean there are multiple issues. One is that the complexity of the science sometimes overwhelms them. Sometimes they don't believe the science. And oftentimes they have their own agenda.

The only thing I can tell you is what I told Charlie Roberts in 1985 when I sat down to my first harbor navigation economy meeting -- well, perhaps my fourth or fifth one. And he was pounding the table, and he looked at me very seriously.

I was the chief engineer at the time for the Port of Oakland. And, you know, you're telling me that the Corps has to do something. And my only comment to him was persistence. You just have to be persistent. You have to keep pounding the message. You have to keep bringing the science in. And if it's not enough, bring someone that can explain it differently even if it is Todd. So, you've just got to be persistent, Ellen. That's the only thing I can tell you. You can't run from the regulators. The laws are set up in such a way that you have to deal with them.

MR. VAN DEN EEDE: There's also this misperception about risks. I've attended and chaired a number of public hearings regarding projects I directed. And it always strikes me that the general public and even a number of regulators in this particular subject or topic, they want one hundred percent safety, zero risk compared to all other activities within human society which are related to a certain amount of risks. And I think this is also one of the basic messages we should get through, that any human activity has certain risks in it. And it's our duty to keep it under an acceptable level.

But what I don't understand is that for inland navigation and then the maintenance of those waterways involving dredging and dredge material, there's a totally different attitude compared with all other human activities. And partly we are to blame, we ourselves, because that's again the question of getting ideas through and marketing

ideas.

MR. ENGLER: I'm going to have to say something today, Todd, Joe. We have to become historians and marketers. If you don't understand your history, you're due to repeat it. We all heard that yesterday. Well, we're repeating our history. We're not telling the good stories. Or if we're telling them, we're not doing a good job.

An example I had in 1980, the district engineer of New York was getting beat to death in the press for desecrating the ocean, a dump site; New York Times, on and on. So he pulled a SWAT team in, me, some other scientists and engineers. What do we do? Let's go to the press. Let's counteract this. So, he invited these 26 newspapers out to a hopper dredge and showed them desecration firsthand. We gave them a briefing. We dredged. They saw the stuff coming in, we hauled them out to the placement site. We briefed them on the engineering, the ecology, what was happening, what wasn't happening. They had a good meal. And we made front page second section New York Times saying, "ocean dumping is okay if managed properly."

We basked in the glory. What we forgot was that when that piece of newspaper was at the bottom of a bird cage, it was old news. And we never followed up. It's a continual marketing process. Look at Colgate, that's what they do.

All right. A question way over there.

MR. RUSSO: Edmond Russo with the New Orleans district. Quickly I just wanted to talk a little bit about public perception and advancing waterway projects. Historically in the past the Corps of Engineers' projects have been usually single purpose, but we're going to have to look more at multi-objective projects that will allow waterway projects to move forward, but to also serve other purposes as well such as environmental restoration or water supply, flood control, and so on; some of the other water resource areas.

And, of course, that's typical of the Florida Everglades project. You could characterize it in a lot of different ways. Some people call it a water supply project. Some people call it an ecosystem restoration project, but it suits everybody's needs in a very unique and satisfying way for those folks.

So, that is a key way to integrate public perception in a positive way, but also to advance those different projects based on problems, we need an opportunity in that region.

MR. STEINBERG: Warren Steinberg, retired from the Corps now, consultant. Joe, I'd like to comment on that \$50,000 per acre of wetlands and to say something about it. You mentioned that in connection with Poplar Island. Very quickly this Poplar Island and the Chesapeake Bay state law prohibits any open water dumping or dredge material. So, they had to get something that everybody would sign up to. This was an island that had sunk from 1,100 acres a hundred years ago down to four acres. And everybody thought it would be a good idea to restore it. However, let's put half of it in wetlands. So, the real cost for the wetlands was, if it was all wetlands, how much dredge material could you get in versus cutting down on the quantity by virtually half of it being wetlands. And roughly I think your figure is right about \$50,000 an acre.

But in the absence of that, you don't have a place to put dredge material. And so

this is similar to the Upper Mississippi River where \$20 million dollars a year is going into the Upper Mississippi management program.

I can't point to a lot of restoration projects of major size, but it's a good program. And for the long haul, it will help in not only restoring the Upper Mississippi, but also in proceeding with navigation projects.

So, it's difficult to put a price tag per acre, and I just wanted to make that comment.

MR. WILSON: Thank you, Warren. It is an important point. I don't argue with any of the environmental projects we've done. I think they're great projects. I think the question is are we getting the biggest bang for our buck. And sometimes we are, sometimes we're not. Sometimes we have to make decisions based on regulatory constraints and political realities.

And I think in the case of Poplar Island, it was both of those. There were political realities that came into play, and there were regulatory constraints. The regulatory constraints were something that I don't think we fought hard enough in that the state, again the Federal government partially waived its Federal supremacy. And so we were required to comply with the state requirements.

Was it the best thing to do in the interest of the Federal taxpayer? I don't know. I think that there were some cheaper alternatives that we didn't explore that had environmental advantages such as disposal. We had some deep pits in the Chesapeake Bay that were anoxic that could have accepted a lot of dredge material over a long period of time.

We were precluded from seriously looking at those because of the state prohibition as you pointed out on putting dredge material in the water. So, there are some realities that we have to reckon with.

MR. WAKEMAN: This has been far too friendly. We need to stir it up a little bit. I want to challenge the panel on several issues. One, why haven't you talked about looking at the bottom line?

The Europeans' Transport Policy 2010 has internalized costs, then they start to look at what's going to hit people in their pocketbook. Why haven't we talked about that? Because that will change behavior, and changing behavior means using incentives. I agree with what Peg said that attempts to change behavior with a stick are just not working. Why aren't we focusing on environmental performance? Why do you keep talking about assessing environmental impacts? No wonder we're getting beat up.

If you look at environmental performance, if you should measure that and what the real costs of that are, you're going to change behavior. And why don't we revise legislation? Joe is absolutely right. The current system as it exists in the fragmented manner itself is doomed to a collision, and the wreck is waiting to happen.

Your barges aren't moving because it's just a matter of time before the right law stops you. I'll give you a case in point. Dredging projects whether they be on inland navigation or coastal ports are improving the air obviously, but they're going to have a short-term air impact as they're put in place.

But if they're not put in place, that cargo is still going to move. It's going to come to Wal-Mart via truck from some port that does have deep water. That additional impact

to the non-attainment regions will not be quantified during the current project process. What will be quantified is the impact of the dredging project.

Let me tell you this is a no win way to the current form that's set up. Why do we have conflict, Anatoly? Why do we have conflict? Because on one side we write the design document. On the other side we write the environmental impact statement. It's a recipe for conflict.

The game is set up the way it's set up right now, and that means that the projects are not going to be driven by good sense or rationale. They're going to be driven by politics. And that's what's happening in the EU. Any response from the panel?

MR. EEDE: I would like to comment on the second remarks before I leave the floor to my colleague, but it is indeed my opinion.

The state of mind in which a project is being designed is already a decision for the outcome because we always talk on the defensive side, which means we have a project there, and we try minimizing the impacts and then between brackets negative impacts.

But I think my point is we should start in an offensive way, in a friendly offensive way by all means, but pointing out that we have a project there and that our objective is to maximize the benefits for society instead of always trying to prove that okay, there will be negative impacts, and we are going to minimize them as far as possible.

MR. WILSON: Well, Tom, let me not help you any here, but pour a little gasoline on the fire. It's actually worse than you presented. I mean you're absolutely right that we ought to be looking at the overall bubble of creating impacts from extra trucks.

But in reality the way the law and the regs, EPA regulations, Clean Air Act regulations are set up, it's not only are we required to look at the impacts of the emissions from the dredges, we're also -- bear with me here -- being asked to look at the impacts of workers driving to the job site to get on the dredge, driving their SUV's, and everything else as part of the emission equation.

So, you're going to be reduced even more to the amount of emissions you can have on your dredging operation. So, it's worse than you presented. And I do believe that before this Clean Air Act issue gets finally resolved, I do believe that Congress is going to get involved in it because I think it has implications on a very long-term basis for all the dredging industry in the United States.

MR. ENGLER: One more question, then we have to put a lid on it.

MR. BEECH: Doug Beech, private citizen. We heard from Les about what turns on the adult mind; sex and scandal, and such things. And then we heard from Joe about our educational outreach program, which is excellent. I'm not sure there's much sex and scandal involved in it.

But using those kinds of thoughts and concepts, and I don't think this is probably a function of the Federal government, but is there a role here where instead of being perpetually on the defensive and defending ourselves in the media, we would, in fact, become more pro-active in attacking those who attack us.

I say I don't think it's going to be a Federal role and follow it up like Mr. Parker, but maybe there is a role somewhere here where we would go way more on the offensive. And perhaps American Rivers has its own scandals or such.

Are there any thoughts that the panel might have on things like this?

MR. SUTTON: Our industry is too small to square off with the environmentalists and try to change all public opinion. We need to target. And when we try to change opinion, we need to talk to them about things they understand.

Traffic congestion and clean air they understand. And by the way in the plan for Houston, we were able to convince the regulators that we should get credit and did get credit for barges being more environmentally friendly than alternative measures of transportation.

But the other problem that we had is everybody is for the environment. And it's so easy when we start -- if we don't have the facts, and if we don't zero in on what's important to people, it's so easy to get branded as anti-environment.

However, the Ohio division has done a lot of work on the clean air value of water transportation, and we're beginning to move that as we get more facts. And those things, again things that people are interested in are reducing traffic congestion and clean air.

So I think if we zero in on the people that are important to us, i.e., the constituents of the representatives that have to vote on our projects, I think we'll make a lot of progress. I think we are making progress in that area.

MR. ENGLER: I told Tom Wakeman our time is up. We've got a busy afternoon. I want to thank the panelists. I thank the audience for some good questions.

Introduction of Technical Program, Day Two

By Dr. Anatoly Hochstein

Good morning. Today it appears we have a relaxing pace. For one, we don't need to introduce ourselves today. We already know each other, and we can go straight to our technical program.

Today we also have two more panels. One dealing with project financing, and another with research and technology. What is, however, obvious from yesterday's discussion, is that it is very difficult to separate the overall subject of how water transportation will exist in the future into separate subjects – panels.

It's obvious to all of us that all the panels relate to project financing. Issues of technology are also related to financing. And to be honest, everything comes down to financing like the focus of what can be and should be done. We had most interesting discussions yesterday. I would not attempt to summarize them in any way now, because that will be done at the end of our session; but having a second chance to talk to you, I still would like to mention several points, which appear to me to be important.

We have the White Paper in Europe as a guiding document. And we have the MTS, Maritime Transportation System, as a major initiative in the United States. During our discussion, I realized that they're closely related. It is a matter of “colors”. Now I understand that our MTS is, in European terminology a “Green Paper” moving towards becoming “White Paper”.

The MTS is at the stage when we formulate our desires and priorities within the water transportation industry. In Europe it would be called Green Paper. Then, and I hope it will be the case, recommendations of the MTS, will translate themselves into legislative actions, such as in the re-authorization of TEA-21. This would become our equivalent of the White Paper because the White Paper is something, which is endorsed by the highest legislative and administrative authorities in the country. I think that it is, in fact, a very logical and similar procedure on both continents. It's different terminology, but the objective is the same. It appears to be the determination of the industry in the U.S., to move the MTS into a legislative and a decision making level.

The focus of our discussion today, naturally, is on financing. To some great satisfaction, after presentations by our European colleagues, I realized that the process of obtaining funds from the government is as complicated in Europe as it is in the United States. There are differences, however.

One of the major differences is that the environmental and other external benefits in Europe are a very significant part of the planning, project prioritization, and funding. For instance, the program named Marco Polo was mentioned here. Marco Polo provides relatively modest funding, but it gives incentives. Under this program, ten percent of

costs for projects, which are considered to be environmentally advantageous are provided an incentive for implementation.

For example, if a segment of a highway goes to a river port or to a coastal port, suggesting that this segment of highway would not be just for transit, but it would be for intermodal -- multi-modal usage, then Brussels covers ten percent of total costs and says, is your incentive to proceed with this specific project.

We have also begun to talk about an accounting for environmental Benefits in transportation planning. Let me bring up one more example. We recently received a document from the United Kingdom. Please note that this is from the United Kingdom, which is never considered a major inland waterway "power"; inland waterways in England, as you know, are mostly for recreation and just a little for cargo. Nevertheless, the U.K. established an interesting national policy. That is, if somebody is brave enough to develop a river port and take trucks from the roads to water, the project would be entitled to receive funding from the government. This funding is assessed proportionally to environmental benefit.

The number of trucks which can be taken from highways to water is calculated. Then, the public share of the funding is determined by multiplying ton kilometers, generated by these trucks, and a range of "environmental gains" - 50 cents to \$2.00 depending on the type of road. Maybe this is not much in terms of money, but I think it's quite a nice gesture.

Therefore, in the area of Financing, I would emphasize one important direction, which we need to address at this time. That is to take into account environmental and other social benefits. The existing methodology for project feasibility was been developed by the Corps of Engineers some 30 years ago. It is methodology for so called national economic development, (NED) benefits.

This methodology appears to be hopelessly out of date. With this type of methodology, I don't believe we'll be able to justify any development projects, because this methodology limits waterway benefits on both ends. First we compare benefits with and without the project. And when it is with project, we have to account for all environmental mitigation measures, which may double if not triple the cost of a project.

At the same time, in accordance with the same methodology, we do not account for any external benefits generated by the same project. We do not calculate environmental and other social savings which maybe provided by a project. We only take into account direct economic or financial savings. For long-term projects, it is very rarely sufficient to justify significant investments.

Let me bring to your attention one example, to illustrate how difficult it is, based on existing methodology, to justify water transportation projects. For some time, the Maritime administration at our Institute, has been trying to introduce Coastal shipping in fast ferries. This is a very appealing possibility based on ferries moving with speeds

comparable to the speed of trucks. The crafts can be built at the U.S. shipyards at relatively acceptable costs. These vessels can carry domestic trailers, and international containers by water, relieving such critical transportation routes as highways I-95, I-10, and I-5. It is a promising possibility, which might improve flexibility, security, and reduce the costs of our transportation system.

Can we implement it? I doubt very much that we can justify this system, based on the existing methodology for evaluation of project feasibility. Presenting the benefits of this system, we only can account for a difference between rates on water and rates on highways. All the other and real benefits - relief of congestion on highways, lower numbers of fatalities, and less air pollution, would not be counted as a benefit of this project, if the current methodology is applied.

In the past, we used to develop so called demonstration projects; I don't know of many demonstration projects initiated lately. Coastal Shipping, in my judgment, is a perfect example of the need for a demonstration project, which would test the necessity and advantages of coastal shipping.

Moving to the subject of research and technology. Here is also a kind of a rather peculiar situation. I reviewed the document, which is Harvard's assessment of technological advances around the world. And, though, most American technologies ranked high, in the maritime arena, we are 16th or 17th, far behind Singapore, France, Netherlands, and so it goes. There are a number of reasons for this unfortunate situation. Let me just give you one example here.

In the U.S. Department of Transportation every represented mode of transportation, highway, aviation, and rail all have large R and D appropriations. There is only one agency in the Department of Transportation, Maritime Administration, which is an exception. There is no R and D money in The Maritime Administration. And that is applies to the entire industry, which needs it the most. The rail industry and aviation industries obviously have more financial power, they can sustain some losses introducing new technology or conducting their own R and D programs.

Our industry, we all know, is fragmented and not as financially powerful. Therefore, here is exactly where support is needed for the introduction of new technology and new methods of operation. Hopefully this situation will change with the help of our discussions. Thank you.

Panel 3 Background and Introduction

By Mr. Harry Cook, President, National Waterways Conference

Thank you very much, Anatoly. The topic of our panel this morning is financing water transportation projects. Let me give you a very quick overview of financing water projects in the United States. For 200 years, from the nation's earliest origins up until 1980, we had a toll-free waterways policy applying to the inland waterways, coastal and Great Lakes ports.

The theory was that, in a competitive economy, the savings in transportation costs would be passed on to shippers, to receivers, to producers, manufacturers, processors and, of course, American consumers and taxpayers.

So, there was no effort to recover the costs of Federal investments in port and waterway improvements. And, of course, they began small in 1824, as we heard yesterday, and increased over time. There were two eras of dam-building and waterway development in the country, notably in the Depression years prior to World War II, and in the three decades following the war.

Shortly after World War II, a series of commissions recommended navigation cost recovery--the Hoover Commission, chaired by a former president of the United States; the Mueller Commission, chaired by Frederick Mueller, Secretary of Commerce; and the Doyle Commission, chaired by a former Air Force general who was commissioned by a Senate committee to study transportation policies. And this all happened in the 1950's.

This was the genesis by the way for the organization of the National Waterways Conference, which I'm privileged to represent today. The conference was organized in 1955 and chartered in 1960 to document the public value of Federal investment in waterway programs.

In 1975 through 1978 there was a national debate on waterway financing policy. It was precipitated by the need to replace and enlarge a congested lock on the Mississippi River System in Alton, Illinois, just north of the St. Louis. And the authorization of a replacement lock turned out to be a very difficult undertaking in the U.S. Congress because a newly elected senator from New Mexico and a very aggressive staff set about to impose user charges on inland waterway transportation.

And over a three-year period, they succeeded in elevating this debate until it became a national issue. There were Congressional hearings. There was debate on the House and the Senate floor. There were newspaper editorials. And during this process, half a dozen different financing mechanisms were suggested--ton mile charges, either uniform or segment-specific; a transportation waybill surcharge of, say, one percent; a lockage fee or toll, and segment charges.

With segment charges, each segment of a waterway system would pay its own way. And we put out something called a toll meter, which took the charges per segment expressed in mills per ton-mile and related that to a barge-mile, showing what one barge carrying 1,500 tons of commerce moving one mile would pay in dollars and cents.

On the lower Mississippi, the fee would be only 15 cents to move that one barge one mile. But on, say, the Missouri River, the fee might be \$13.50. Just to show the wide disparity between the mainline system and the tributaries, which I think succeeded in shooting that idea down.

The next idea was congestion charges so that congested locks and facilities would have a special charge, which would delay or forestall a replacement project.

On our side, some of our people were suggesting that we share customs revenues, or customs sharing. The Treasury already realized the billions of dollars coming in from customs. So, that didn't get anywhere.

In the end, there was a waterway fuel tax enacted, starting in 1980 at four cents a gallon ranging up to 10 cents a gallon by 1985.

In the meantime, President Reagan took office in 1981 and almost immediately called for cost-recovery user fees on the inland waterway system, and, for the first time, on the deep-draft waterway system. And that set off a five-year debate over how the deep-draft user fees should be structured.

The smaller ports were in favor of nationally uniform fees. The larger ports wanted port-specific fees. This debate was settled in 1986 with the passage of what we call landmark legislation or watershed legislation, if you will, that established a nationally uniform ad valorem fee to cover 40 percent of the costs of dredging and maintaining deep-draft access channels.

The legislation also included the requirement that non-Federal interest put up a certain share of the cost of deepening coastal channels, somewhere between 40 percent and 60 percent of the costs depending on the channel depth.

Although there was still some hope among inland operators that the inland waterways fuel tax might be repealed because of the impact on the users and detrimental effects on the system itself, this tax was doubled in the 1986 legislation from 10 cents to 20 cents per gallon.

But the effective date of the tax was delayed for five years. So, it didn't start taking effect until 1990. And it was implemented in stages. It reached 20 cents a gallon in 1995.

In the meantime, the Clinton Administration came into office. And in 1993 the administration made a very serious effort to increase the fuel tax by \$1.00 a gallon to cover 100 percent of the operation and maintenance costs on the inland waterway system.

One-half of the operation and maintenance costs of the deep-draft system was covered by the initial ad valorem fee. And that was subsequently tripled from 40 percent to 120 percent of the costs. And that resulted in a big surplus in the Harbor Maintenance Trust Fund. So user charges have played a big role in financing our waterway system.

In the last eight or nine years, the administration has been working the other side of the street. Rather than submitting a realistic waterways budget, and then trying to recover it through some type of user fee or user tax or charge, the administration has year after year been low-balling the civil works request.

Congress fortunately has increased every year the funding up to a more realistic level. This year's budget is no exception. It limits investments in construction, and in operation and maintenance. And it particularly restricts the money for new studies that will start projects in the pipeline for authorization.

As you will hear in some detail from our panelists, it has taken a very concentrated effort to get Congress to restore the civil works appropriations to an acceptable level. The MTS, the Maritime Transportation System, initiative seeks to address some of the financing problems of the inland system.

Jeff High, who was on the program yesterday, has advanced an idea where funds coming into customs might be capped, so that the incremental increases resulting from increased imports and exports would be allocated to the marine system.

Federal budgeters have forecast the amount of revenue coming in from customs over the next few years at a certain level. However, projections by shipping companies, ports, and others indicate that international shipping, particularly in the container trade, may double or triple in the next 20 years.

So, the increase in customs collections may far outpace what is anticipated to come in. And this wedge of revenue from customs duties might be allocated to a navigation trust fund of some sort.

Well, sadly in the United States, as we've heard repeatedly yesterday, there's no official recognition of the important role which water transportation plays in reducing exhaust emissions, promoting cleaner air, relieving overland congestion, and moving a large share of America's freight in a very safe and efficient manner. I'm sorry to say that barges are not only unseen, but they're like Roger Dangerfield; they don't get the respect they deserve.

Criteria for Economic Feasibility of Water Transportation Projects

By Mr. John S. Doyle, Vice President of Government Relations, Waterways Work!

Thank you, Harry. Good morning everybody. It's a pleasure to be here and with you for this 100th Anniversary of PIANC. I've known of PIANC for many years, but this is the first time I've had an opportunity to physically be present with you. And I've got to tell you, I'm very impressed with what I've seen so far.

As Harry mentioned and the program indicates, my topic is economic feasibility criteria. And so I'll talk a little bit about that, but I'm going to talk about some other things as well, and hopefully leave you at least with some thoughts that you might not have had before the conversation.

Let me mention a brief word, a little bit more on Waterways Work. It's a new campaign designed to promote the things that the people in this room understand and have understood for years; the enormous value that our nation's navigation system both in inland waterways and the coastal ports provides to this nation and our way of life.

It's about a year old. Currently we have around 230 members, about 37 national and regional trade associations and national advocacy groups, and the rest individual member companies. We're made up of shippers, carriers, ports, national groups, all of whom benefit or see the benefit in the waterways and their contribution to this country.

The purpose is not to re-create the wheel, but rather to supplement and amplify the voice of the excellent organizations, the advocacy organizations, already in place, the waterways conference, American Association of Port Authorities, Dynamo, American Waterways Operators, and other groups that you're familiar with.

I do have samples of some of our materials that I can show anybody who would be interested. And we would welcome any additional participation of membership that you might be inclined to feel is appropriate.

Let me also say that what I'm going to say here this morning represents my views, my personal views. It is not the official program of the Waterways Work Campaign; that program you've been hearing about in bits and pieces for the last two days. Our message is the same message that we hear over and over in the various talks. And that is that our nation's inland waterway system and coastal ports provide enormous value to this country that just is not appreciated. And we need to get that message out to policy makers, and we need to get that message out to the American people.

So, what I'm going to do here is give you some of my own personal observations. If Mark Twain were here, he might even use the word "ruminations". And hopefully prompt some additional thoughts on your part.

Harry, that was a great historical summary to take us to where we are today I thought. Let me just mention one thing on the administration budget before moving into what I've prepared. While the budget this year is far below what it should be and what clearly can be justified in almost any terms, economic or otherwise, I would be remiss if I didn't point out that one of the hallmarks of this administration's budget this year is a re-focusing of the Corps program a reprioritization of the Corps program, and a redirecting back to its core, C-O-R-E, missions one of which, of course, is navigation improvement.

And so what we see in the budget is a very significant proposed increase relative to last years' administration proposal for inland waterway construction funding, for example. Over a 50 percent increase, if you go through the document and take a look at the numbers.

And so I need to point that out before starting into the rest of this. There are problems with it. One of the biggest problems, of course, is what is being proposed for the study program, but we can talk more about that later if you like.

I, like many in this room, have been troubled, extremely troubled, by the withering attack that the Corps of Engineers has been subjected to lately, particularly in the last three years. National environmental groups have seen their consistent anti-Corps rhetoric repeated and amplified by liberal media players like the New York Times, the Washington Post, and others. It is not surprising, nor is it a new phenomenon.

When I first joined the staff of the House of Representatives in the late 1970's, and Harry provided a little context for that in his history and reminded us of where the debate was at that time, these same environmental groups and papers were engaged in a similar, to me at least, campaign to attack and discredit the Corps and its programs.

What particularly troubles me, however, is seeing traditionally more conservative papers like the Wall Street Journal and the Christian Science Monitor also take up the critical call using terms like pork barrel and waste and out of control in discussing Corps programs, as recently occurred in articles discussing my partner's departure from the Assistant Secretary of the Army position.

Now, it's possible that the articles in the journal and in the monitor were part of an administration public relations strategy to explain, some in Washington might say spin, the Parker decision and deflect the significant Congressional opposition to the decision that was being heard. Or it may be that the two papers' core critical editorials are truly reflective of their author's views.

Either way, the explanation is enormously troubling for me and so many others who know an Army Corps of Engineers that is so different; that is the preeminent government water resources engineering agency in the world.

Increasingly I've struggled to find an answer to the question, what's going on? Why is it that the Corps is subject to these tirades when other Federal construction agencies, Federal Highway Administration, Federal Aviation Administration, Federal Transit Administration to name just a few are spared the same kind of treatment?

Could it be that the critics are correct? That the Corps today lacks the integrity and the technical competence that have been the hallmarks of its proud 200 year old tradition? I think not.

As we here know exactly the opposite is the case. And I'm convinced that the American people, and their elected representatives, and the U.S. Congress still strongly recognize and support the Corps and its superb technical expertise. If it were otherwise, the Corps would be losing missions instead of continually gaining new missions as has been occurring in recent years.

The formerly used sites remedial action program or FUSRAP, and the Super Fund Clean Up as part of the Work for Others Program are just two examples.

Just last week at the House Water Resources and Environment Sub-committee Hearing on this year's Water Resources Development Act or WRDA, testimony was presented on the part of the Great Lakes Commission urging that restoration of waterfront and related areas for the purpose of economic development and Brown Field Redevelopment should be added to the growing list of project types that the corps would be authorized to plan, design, and construct. This is hardly the sign of an agency that's lost its technical reputation. So the integrity is still there, and the competence is still there.

What then explains this latest batch of criticism? Part of that answer I believe lies as it always has in the extreme political agenda of some, not all in the organized environmental movement who view any and all economic development and instrumentalities facilitating that development as contrary to the public's interests.

Since development typically changes the environment, and any change to the environment is bad according to this agenda, any change agency like the Corps must be opposed.

But this view is not new. In fact, it may be as old as the druids of thousands of years ago. So, something else must help explain the new wave of corps criticism.

May I suggest that some part of the answer lies in two factors that have only recently begun to come into focus for me. They're distinct, but related at least in my mind.

The first might be characterized as an example of the law of unintended consequences. I'm coming to believe that with the best of intentions in terms of confidence in the Corps of Engineers and its capabilities, policy makers in Washington

may be unintentionally putting the corps in a position where the corps can't possibly achieve the kind of results that the public expects and that the corps is capable of delivering from a technical and management perspective.

As mentioned a minute ago, the corps is being asked to do more and more every year. At the same time, it's expected to re-invent itself meaning down size or at least not grow, and to perform its new missions and projects without significant new funding.

The budget and appropriations process under funds the corps' program and spreads what funds are available over the broadest possible mix of projects resulting in most projects being delayed and few, if any, being completed within budget from a time and cost prospective.

In today's cost sharing world, this disappoints, or worse the project's cost sharing partner and creates the very under performance conditions the corps critics can use to lend vest the agency and its results.

There's a grave danger that in continuing to proceed in this fashion in trying to have the corps be all things to all people, so to speak, we may end up satisfying no one; an outcome which must -- we must find a way to avoid.

The second factor I'd like to mention is project feasibility criteria, the topic of this presentation. I would like you to consider, if you would, the possibility that one reason the corps has been under attack recently is that there is enormous confusion and lack of understanding, not to mention lack of consensus both within the Congress and among the general public concerning what criteria should be and are used to justify corps projects.

Without the requisite understanding and acceptance, the project selection criteria becomes much easier for corps opponents to slap a pork barrel or waste label on a given project and much harder for the corps or other project supporters to defend against such an attack.

The current unsettled situation concerning project selection criteria is the product itself of a number of factors. One is the method of calculating a project's economics. Anatoly did a great summary of that just a minute ago.

Projects having flood control reduction or navigation improvement objectives are determined to be economically feasible if the project benefits exceed its costs. Based on an analysis, a project plans increase in the economic value of goods and services, and the opportunity and other costs of resources consumed by the plan.

For port and inland navigation projects, benefits are measured in terms of transportation savings to shippers. But as the corps feasibility study on the Upper Miss and Illinois River has taught us, finding an agreed upon method to calculate those transportation cost savings can be enormously complex and controversial itself.

And even if an attempt -- and even if an acceptable calculation method can be found, the debate doesn't end there, but only begins. For example, the National Corn Growers' Association recently released an evidence study on the economic impact of increased congestion on the Upper Miss and Illinois River Waterway. Found hundreds of millions of dollars in additional benefits related to tax revenues and employment at the Federal, state, and local levels for improving seven locks and dams on the lower regions of the two rivers.

Another confusion factor is the need to consider other non-navigation benefits as well as transportation cost savings without having a nice neat formula to relate the different categories.

As part of our Waterways Work Campaign, we continually point out that port and inland waterway transportation is far superior to the other modes in terms of air pollution reduction, public safety, and congestion relief.

Relative weighing of the air pollution versus safety, versus congestion relief, versus economic benefits, however, is left to the listener to perform based on his or her own individual value system.

We don't have a way really to tie those together in a mathematical, if you will, format. And even if we did under the current procedures, you wouldn't be allowed to count them as Anatoly has so well described.

To muddle matters even further, rigid benefit costs, economic analysis is not employed to evaluate the feasibility of all types of corps projects. Environmental restoration projects are typically authorized by Congress based on a demand or an assertion by Congress that the project's environmental benefits exceed the project's costs. Economic analysis to the extent that it's relevant at all for environmental projects typically seeks to find the least cost alternative to achieve the deemed beneficial environmental objective and doesn't bother at all with rigid benefit cost calculations.

To further confound and confuse, there is a major procedural disconnect or dichotomy between how corps, port, and inland navigation water projects, for example, are selected, and how major infrastructure projects are selected in the highway and aviation world. Rigid cost benefit calculations are not required or performed for highway or aviation public investments. Rather a more process-driven political consensus building process is typically employed to select and prioritize candidate projects.

Congress had no trouble in TEA-21, for example, a six year \$218 billion dollar funding law that extends through September 30 of next year in allocating those \$218 billion dollars without requiring the type of benefit cost analysis for projects funded under TEA-21 that's required and expected for corps navigation projects.

Further, Congress had no trouble in that same legislation in allocating \$9.3 billion dollars, almost the amount of the corps construction general funding for those same six

years in total for 1,850 high priority projects based on the relevant Congressmen and Senators' understanding of which specific projects were most important to their constituents.

Am I the only one who's confused? I don't think so. We use benefit cost criteria for some corps projects, but not for others. We calculate benefits by considering transportation cost savings, but excluding other economic benefits like employment and tax revenue and productivity increases.

We load the cost side of the calculation with ever increasing costs related to achieving environmental objectives, but we completely disregard in the calculation the value of the environmental and other non-navigation benefits that the project delivers.

And our competition for too scarce Federal infrastructure dollars have nowhere near the same project selection gauntlet to survive in order to get funded.

Meanwhile, the corps is being given more and more types of work to do with nowhere near the level of funding that's needed to do it the way they're capable and with an ever diminishing work force.

We live in a world where technology allows us to discern and quantify in ever more minute dimensions one part in a quadrillionth we heard yesterday. But it's a world where too many people mistakenly confuse the ability to measure with the ability to understand.

And remember Les Sutton's great slide yesterday on the many issues competing for the public's attention span. It's increasingly a world of information by 80 second sound bite. Now flavor that with well-funded opponents with ready access to the media and an anti-growth anti-development agenda, and I anyway begin to better understand the answer to my question of what's really going on.

So, what do we do about it? First we must work that much harder and smarter to get our message out to the Congress, to the administration, to the general public. There is a good story to tell. People will hear it, react well to it. All of us, everyone in this room must commit ourselves to the time and energy and hard work, and it is hard work that it takes to explain over and over again how important waterway transportation is and will continue to be to this nation.

Second in telling our story, we should not feel constrained to limit the discussion to the narrow confines of current approved procedures for calculating benefit cost ratios. We should feel free and, in fact, obligated to help policy makers, the media, and the general public understand and appreciate the value of our waterways in terms of things that they understand and care about like congestion relief and air pollution reduction and employment and international competitors regardless of how those issues are dealt with or not in benefit cost calculation regulations.

Third, perhaps it's time for a formal thorough public policy debate about what criteria we should be using, how we should be calculating them, and what their limitations are for the purposes of making Federal water and other transportation infrastructure investment decisions.

Perhaps it's time for us to take the discussion that we've been having here for the last day, and I suspect for years before that, and bring it public and have that debate in public.

And finally maybe we are at or approaching the time that the nation needs to reconvene a national water policy commission to evaluate in an open and comprehensive fashion what this country's water related needs are as we move forward into the 21st century, and how we propose as a nation to assign institutional roles and responsibilities to address those needs in a publicly understood and publicly supported fashion.

Periodically in the past as Harry has summarized for us, and it seems to me to be on about a 20-year cycle, similar efforts have had a very significant and positive for the most part impact in defining and bringing definition to the issues and clarity to the public policy options that are available for dealing with those issues.

Let me at this point bring this presentation to a close. I hope it's provided a thought or two that might not have occurred otherwise. I'd be happy to discuss them further or answer any questions you may have during the Q and A session this afternoon. It's been a pleasure to be with you here this morning. Thank you.

Inland Waterways: The Funding Challenge

By Robert Pietrowsky, Director, Institute for Water Resources, U.S. Army Corps of Engineers

Thank you very much, Harry, I appreciate it. What Harry didn't mention is I'm pinch hitting for Rob Vining. Rob's name was originally up on the slides, and he unavoidably is fire fighting some of these bloody wars in Washington this week and couldn't be here, but he does offer his apologies.

Excellent introduction, Harry, thank you. You set the context for the presentation. Rob was going to complement Harry's discussion of the inland waterway system, focusing on a discussion of the fuel tax system.

It's a subset of the 25,000 miles of navigable waterways set by law. Harry described 11,000 miles anchored by the Mississippi and tributaries, but including those waterway segments, 27 waterway segments that by law are subject to the fuel tax and generate revenue that ultimately is cost shared 50/50 from the Inland Waterway Trust Fund to construct new waterway projects.

We've heard a lot about the value of the waterways. You've heard these statistics. You know that petroleum products, coal, farm products are the key ones traveling on the waterways. What's unsaid, though, beyond the fact that the 600 million tons generate over 300 billion ton miles is what would happen if we didn't have inland waterways.

Well, this volume of commerce would translate into over 6 million rail cars annually or 25 million truck movements. I've driven enough on route 80 across country or route 81 north/south. I don't want to see one more truck on the road, let alone 25 million more trucks, so certainly that's unacceptable.

The Institute for Water Resources has done some work with Tennessee Valley Authority (TVA) trying to get a better handle on the total movement of commodities. Not just the water side movement, but the land side, leading to the water movement.

Remarkably, more than half the country, not just the states along the river, but more than half of the country, 31 states contribute commodities that flow to the waterways. These are important industries that generate thousands of jobs in towns across the country. Again, benefits that are unstated in terms of the traditional analysis.

You heard Mr. Izzo the other night use the transportation cost savings quote also, and that's another misunderstood fact about the waterways.

Rob wanted to talk a little bit about the aging infrastructure. And this again is an underappreciated problem that the Corps is dealing with. It's not a pretty picture. Mr. Izzo talked about Lock and Dam 11 on the Upper Mississippi as one example. But many

of our structures go back to the '30s. And this is a slide showing the distribution of the age of the lock chambers on the system.

Forty-five percent of the lock chambers have exceeded their design life of 50 years already. By 2010 that will grow to 55 percent. We're already at the point where this is influencing performance. And you start to see some of that performance impact when you look at a concept like lock "unavailability."

This is the outage time of the locks. What we've seen over the last ten years is that the amount of time that lock chambers have been unavailable has increased dramatically. These include both planned outages, when major rehab or repairs are planned, and unplanned. But both have grown, and it is certainly synergistic with the aging of the infrastructure and the O & M backlog, which you've heard about.

Of course on top of that, waterway traffic is growing despite what you may read in the Washington Post. It's not growing as robust as the international commerce flowing into the country, but it appears in the forecast we've developed and the trends we've seen. The growth is certainly steady, one to one and a half percent annually.

The compounding of that growth rate leads to an increase of about one-third by the year 2020. So, we're talking about potentially, in terms of an unconstrained forecast, another 200 million tons that could be flowing to the waterways.

Now, growing traffic and an aging infrastructure just eventually influence capacity. So, we have problems with congestion. This particular slide contrasts the dilemma, the old Lock and Dam 26 shown in the upper right with the smaller chambers that had to have most tows cut compared to a new modern 1,200 foot chamber that can accommodate the industry standard, 15 barge tow.

This slide shows the average hours of delay per tow for a ten-year period. It's quite remarkable. We have 20 locks on the system that have delays on average per tow of more than one hour with 17 of those more than two hours. And you see several up in the over four-hour range, including the Inner Harbor lock that has a 12-hour delay average; quite remarkable.

Of course, this gets worse during the peak season. This slide which depicts the average lock delay in the peak month highlights the bottlenecks. And the bottlenecks are in the work horse locks, some of the busiest locks in the system.

And again when you combine this with the aging problem, it's not a pretty picture, and it cries out for investment.

This is a little summary of the financing mechanism that includes both inland waterways on the bottom and international harbors on top. Harry talked about this, and it is a complex system of a combination of both general revenue for certain functions and a

combination of user fees. On the harbors, it's an ad valorem tax on the value of the cargo flowing in and around the country. And on inland waterways, it's the fuel tax.

This is a snapshot of a typical budget year for the Corps. Typically the navigation function, both the deep draft, the coastal work, and the inland waterways, comprises about 40 percent of the spending of the Corps budget.

The items I wanted to talk a little bit about today in financing are the cost of the inland waterways construction. That's inland waterway construction which John talked about. For '01 that was \$175 million, including 50 percent which came from the trust fund.

Here's the inland waterway operation and maintenance, which is shown as \$475 million in the 2001 budget. This year the O & M for waterways is down to \$442 million. And the budget proposal for next year is at \$415 million. So we have a dwindling amount of O & M money being programmed for an aging infrastructure.

This gives a little historical perspective on the O & M spending. The red line shows actual dollars in it. Looks like it's going up. But when you work in constant dollars, and these are constant 1996 dollars, you'll see that really for all practical purposes, the spending on O & M on the system has hovered between \$400 and \$500 million for the last 25 years.

Actually, if you extend this to the proposal for next year, the constant dollar amount of \$415 million would actually be lower. It would be under \$400 million, if you make the adjustment to 1996 dollars.

This is an interesting slide. It shows what John was saying is correct about how this Administration is approaching the waterways in a very businesslike, somewhat vigorous approach. Yet, there are a lot of questions about the criteria and the validity of criteria that they're using.

What this slide shows is a percent change on the O & M proposed for various waterways comparing this year's budget analysis to the '03 budget request. The total bar on the top reflects a six percent reduction from the \$442 this year down to \$415.

The waterways listed at the top are the 'losers.' Those bars that go up show the percent reductions that are proposed for those waterways, and they're mainly the tributary waterways. There are some exceptions, but they're generally the tributaries.

It's the smaller ones that appear to have been targeted for reductions. The waterways on the bottom show either steady O & M funding between the two years or a slight increase.

What's happening is that the Administration decided to use a criteria of ton-miles to assess whether a waterway was economically viable. And they used the threshold of 1 billion ton-miles to make that judgment.

Now, there's a lot of sense in it, but that kind of criteria penalizes the smaller tributaries because they don't have the length in their internal movements to generate a lot of ton-miles. And the ton-miles that they do generate throughout the whole system, which can be quite significant, are then not counted in this kind of accounting.

The Institute has put forward David Grier's work (who's here this week); has put forth ideas like system ton-miles, or to actually do a rigorous analysis on transportation cost savings which ultimately could be used to evaluate the economic viability of the waterways.

But certainly at least system ton-miles, if properly calculated, would make a big difference in crediting the tributaries with their economic role in feeding the main stem waterways with the traffic.

This slide is not pretty either. It's the historical prospective on inland waterway construction. This includes the money that's cost shared 50/50 from general revenue and money from the Inland Waterway Trust Fund. The funding peaked in actual dollars just under \$300 million dollars back in 1991 and has never really recovered since then. Recently we're getting slightly more robust budgets.

I'm going to skip this slide. Harry already reviewed the history of the trust fund in terms of when it was operationalized, and the amount of the fuel tax.

But these are the latest statistics on the trust fund. And they certainly cry out for the kind of report that Jeff talked about yesterday from GAO looking at the background behind why the money being generated both in this trust fund and also in the Harbor Maintenance Trust Fund, which actually has much more of a surplus, is not being spent. That surplus in the Harbor Maintenance Trust Fund is now about \$2 billion dollars. At the end of last fiscal year the Inland Waterway Trust Fund surplus was over \$400 million. The Trust Fund took in record revenues in '01, about \$113 million.

So, certainly you could support on revenues coming in, including interest, about \$135 million contributions, which would cry out for something that was at least budget neutral around \$270, \$300 million dollars per year. And that's without drawing down the surplus.

Despite the budget constraints, there's a lot of activity. There are nine lock and dam construction projects ongoing now, five major rehabs. The total cost of these projects is about \$4.4 billion.

Now, of course, if you do the math and if the Corps is getting about \$250 million a year, you see how long it's going to take to finish these projects alone, let alone other projects that could be coming on-line.

One of the examples I know Mr. Izzo gave did receive robust funding. It's the Olmstead Lock and Dam, which relatively speaking did fairly well in the budget. But consider that when it's finished later in this decade, it will have been about 20 years from start to finish, before that project came to fruition.

This is a slide that has some scenarios in terms of what the future could look like in terms of expenditures from the trust fund. The red is the baseline. That's consistent with the president's budget request, and the Corps' ten-year program they work out with Sec Army and OMB. It actually looks more robust than we've seen, although the track record has been that it's been endloaded over the ten years. And as we move each year forward, it seems like the particular budget years tend to be suppressed down closer to the \$200 million dollar level.

The yellow line shows the capabilities out past 2002. That reflects the critical task schedules, the engineering schedules at the various districts. It shows that a program approaching \$400 million, \$450 million certainly would expedite the projects and would allow them to be completed on schedule.

Of course, both of those scenarios would have a different impact on the trust fund balances. The baseline program has modest growth would begin to draw down the balance in the trust fund, but no way would make use of that \$400 million that is sitting there today.

Under the capability program, which overall probably isn't realistic, every project would proceed on its capability schedule. But, nevertheless, if it did happen, it wouldn't draw down the trust fund until the year 2007. It appears it certainly could support a program of about \$300, \$320 million. It would have the purpose of expediting the projects, allow new projects to be started, and would also draw down the balance.

And there are more projects coming. The system is aging, and there are other studies going on including, of course, the Upper Miss Study, Upper Miss and Illinois, work on the GIWW Texas, the Arkansas, Black Warrior, Tennessee. There's a lot of planning work going on. True the studies have been constrained in the budget proposal for next year, but there are many recommendations that may be flowing still for additional work.

So, here is the challenge, just to summarize. We have a system that's vital to the economy of the U.S., vital to jobs and to industries around the country. We have an aging infrastructure that cries out for modernization, with O & M being deferred. We have a backlog of O & M. We have locks that are not just aging, but their performance is being affected both in terms of outages increasing and congestion increasing.

Traffic growth is modest, but it is growing one and a half percent a year. Compounded that's a huge increase over the next 20 years. Meanwhile, we have surplus in both the Harbor Maintenance Trust and in the Inland Waterway Trust Fund.

We would hope that we have the resources in future budgets to address this, but certainly it's a dilemma. And even if the trust fund was going down and the system was funded robustly for the work in the queue, it would still be a challenge to fund all that work. So, there are other issues on the table that need to be attended to into the future.

Anyway that's a quick run through the slides. I hope I kept on schedule, Harry. And I'll turn it over to you again. Thank you.

Challenges for the Inland Shipping Industry from a Western European Perspective

By Mr. A. N. Roos, Director General-Manager, Netherlands Rhine and Inland Shipowners Association

Thank you. I'm very proud to have the opportunity to speak to this audience about the inland shipping industry in Western Europe. I call it a challenge. This is my association.

First I will tell you, coming here was, from all perspectives, quite interesting. Being here and in military quarters here, I'm on somewhat holy ground for inland shipping. I will explain it later to you, but the U.S. Army had great influence on the development of our inland shipping.

First I will start to explain about Rotterdam. Not everyone knows. I will explain to you about Rotterdam and Holland. Some people say, "I've been in Amsterdam; I've never been in Holland." Amsterdam is the capitol of Holland.

You see that Europe is still in the middle of the world from our perspective. There is Rotterdam. It's on the Rhine. Amsterdam is north of it. And this is Rotterdam, near our headquarters of our organization. And you can see our container transport. I'm a member of the European Barge Union. This was founded last year, December last year, seat in Brussels, office in Rotterdam. We'll also have an office in Brussels in due time.

And you see that the major countries in Western Europe involved in inland shipping are also members of our EBU. It's comparable with American waterways operators.

My own organization has 400 members, and we are in different member groups, containers, petrochemicals, dry bulk, passengers, and towing, and special transport. It's a quite interesting segment because the major part of the special transport, big huge transports, in our part of the world do not go over railways, or street or roads, but always over water. It's a very big advantage for the industry.

You can see the share of the modal split in ton kilometers. And you can see that the countries, which are on the Rhine are also the countries who have the biggest share in inland shipping. That's quite logical, of course.

The second thing that you see is that a major part of the industrial flows is still within the borders of our country. One exception is that in our part of Europe, inland shipping has 31 percent of the continental transport, intra-European transport. And you can see how important the Rhine is for connecting countries to one another.

The second thing you see is the importance of short sea, as we call it. That's the connection of our ports to European countries like England, Scandinavia, et cetera, et cetera. The major part of short sea is also situated in the northwestern part of Europe.

Now that's, of course, for Dutchmen a very good slide. A tenth of the inland shipping fleet is Dutch. Well, Belgium is third in place. Of course, they are also developing rather well. So, we have a driving force in inland shipping.

Well, then we come to the fact that we have had a discrepancy scheme in the last five years in Europe. Hundreds of millions of euros were used for scrapping old vessels. And what happens when you scrap vessels, you build new ones. You see here this vessel is towed by many of us bringing vessels to our members.

This is a vessel coming from China. They're all built in China and sent to our country to be fitted. And you can also see that not only are America and Europe important countries in inland shipping, but also China is. Because when they can build this size ships, you can see there are lots of possibilities also in China.

This is our newest container vessel on the left. On the right side are our standard container vessels. The right one transports 200 TEU and the vessel on the left side transports 50 TEU. And also they can have barges in front of them or next to them so they can transport much more than that.

The interesting thing is when you talk about the situation of our sector, of course, those vessels are operated by big operators, which have connections with big firms in Europe. But those vessels themselves, the investments are made by small sized companies. The skippers themselves, they own the vessels, and they build those vessels. And that's one of the strong points of our industry; that there are many small firms which are very much involved in shipping and have their future in it, and so they want also to develop their future.

And also the banking system in our country is very much adapted to inland shipping so that it's not very difficult to get loans to build one, because they know the sector, and they know the profits, the capabilities of it. Yes, this is our truck. This is a floating truck. This is a small vessel. The Neokemp was built last year. This has to do with the fact that many small container terminals have developed in Holland on small water canals.

The particular terminals are more and more owned by trucking companies, which have big problems on the roads with congestion. And they decided to shift partly to water and then you get this kind of floating truck. I think this is really developing rapidly. Last year the growth figures were 20, 30 percent. I mean you talk about IT sector, but maybe we have not the profits, but we have the growth figures.

This is a vessel transporting cars. About 400,000 cars per year are transported by these vessels from the manufacturing sites to inland and back.

Now, on construction and new world terminals. We think this will grow rapidly in the future, so the waters can be used to transport cars which then make, of course, problems on the roads again, and we have in essence doubled.

Well, this is double sized for your view. Of course, this is quite small. But still we are, of course, now in discussions with your country on the import of steel. However, there is one major factor in Europe. In the last year there was a lot of reconstruction in the steel industry and only a small number of big firms survived.

Well, they have modernized, but they are in strong competition. And in Germany the firm which survived is a group organization, and they have decided to shift all their plans throughout the waterways. Because the only way they say to survive in the world market is via transport by water. They say rail is no option whatsoever. The only way is water, transport to and from the sites in Duisburg and Germany.

I come to the history. 1874 was a very important year for us. You had a president who said, "read my lips. No new taxes." This is a no new tax treaty because we have zero tax on the fuel, and there's also total liberty on the savings on the Rhine, which has very important influence on the development of Germany as an industrial nation.

80 percent of the transport costs always is liberalized on the Rhine. The north/south transports on the smaller canals from 1930 to 2000 was strictly controlled. It's very difficult. It's very easy to make a regulation. It's very difficult to get rid of it. It took 70 years to get rid of it. And it's very important to know that from that moment on there's really a newer anti-socialism in the sector. And that's really a fairly new idea.

Well, you see where the major logistical centers are in Europe. And you can see that it's often close to waterways. And when those waterways are more developed, you can see that waterways will have much more impact than is the case now.

Well, you notice this chart. The Northwestern Europe, that's the waterborne site. That's the inland shipping there, and also short sea is an important factor. Also, you can see there is inland shipping. You can also see why in that part of Europe industry has flourished. It has flourished because of water and because of inland shipping. And this also can be explained.

Sometimes the description is all the way around; how inland shipping has to survive. You can change the pattern when you want to survive in the industry or nation, and you will have to have a good connection to the waterways. Well, you see that in our part also large portions of the total transports are transported by water. 80 percent dry bulk and fuels. 60 percent of all petrochemicals or dangerous goods. 60 percent of all dangerous goods are over water. 40 percent, almost all in containers.

And we have, of course, to deal also with harbor policies. I heard yesterday that there are aims to build 206 deepwater entrances to a port. Well, then you have 206

harbor policies in your country. We have six or seven or eight big harbors, and they also have big competition.

And you see that in North Germany, of course, Hamburg, our big port, but the railways are highly subsidized. And you see also the same in France. For ports of Hamburg, it would not really be necessary because this port is really the ports to Scandinavia and Northern England. It's a strong point of this harbor and to the hinterland.

Well, then you see the statistics. In your country you see that the share of car and trucking is lower, but I have seen that the transport within city limits is not included in the statistics.

In our figures, they are included in the figures. When you change this and you only look at the connection between the cities, it's totally different. And you can also see that the water transport is much bigger than road transport.

Well, then we come to the container boom on the inland waterways. And then I say I have here a link. This is from the Military Traffic Management Group, which is situated in Holland. The American Army in Germany had to transport their containers to the hinterland, but they always wanted to do it over water. That's, of course, to do with safety reasons.

So there the first containers went over water, and then some shippers thought well, okay, I transport my containers to the American Army and Germany. Why shouldn't I take back some containers? So, go through your own Army maybe, that's a start. But this is a very important development; it was really the start of our container boom in hinterland shipping.

Well when this started, the operators went to the big carriers, et cetera, et cetera and said well, this is something for you. They said, no, go on. Inland shipping over water, there is no possibility. You can forget it.

And even the port of Rotterdam, they said well, when two percent of all containers are going over the water, then you have the maximum. So, we are used to governments who say there's no possibility for water transport, but we have proved the opposite.

And now as you see we go to 50 percent of the total of all transport from the Rotterdam region. I think also Antwerp will go that direction. It's south from Rotterdam. And you see that 50 percent growth is expected. And when we see the figures this year, we are absolutely sure that we will reach this goal or more.

You see we have 50 container terminals in Germany and Netherlands, and Belgium and north of France. They are all privately owned. They are local initiatives.

The government was not really a driving power in this matter. They thought rail was the future; rail, of course, always.

Nowadays it's changing, slowly changing, because we proved that we are doing very well. And when we are doing well, politics will follow. It's all the way around. We have made a short presentation with the port of Rotterdam on the possibilities of container transport. I will go quickly through it. But I want to make clear that Rotterdam has changed its attitudes.

Well, there you see the numbers. Already you see how big the Chinese ports are. Rotterdam is a small one compared with the Chinese and Asian ports. You also see Long Beach standing there. Well there you see Europe, and then Rotterdam is certainly the biggest. And you see that of the major ports, number 1 is Rotterdam, and number 3 is Antwerp. And those are both ports which have a connection with the inland and water, and that gives those ports a clear advantage.

Well, you know this figure, that's a hinterland picture. These are the advantages. I'll provide some CD roms for you so if you are interested, I can give it to some of you.

The big terminals we're working with, this is the Maersk/Sea-Land terminal. They say okay, many distriparks are connected to water. So, you can also make a distribution there, and then we can go to the hinterland. Inland shipping. You notice we have a different number, 24 hours 7 days a week. In Europe, in Germany and France, et cetera, it's forbidden to drive trucks on the weekends. So, that's absolutely an advantage to us.

Well, we have in this all terminals. There is lots of information in it. And you see the number, the growth of container handling only on the Rotterdam harbor, and that's 1999. I can't tell you the profit for the last two years. And then you see not only in our region the development is very good.

When you come to Belgium, there's only the inland transport. You see growth in two years from 75,000 TEU to 162,500 in 2000. So, it's incredible growth. In France last year the growth was 55 percent. They came from almost zero, but it's going very efficiently.

And for the first time, and that's incredible, France has planned a canal, big canal between the Paris region and the north. And they expect a total growth of inland shipping in France only by this canal of 400 percent. Slowly the moods, the intentions of the government are changing in this respect.

Well then we come, of course, to the fact that in Europe we have much more inhabitants, much more persons per square kilometer than in your country which, of course, fuels the discussions and makes the problems on the roads much more rigorous than in your country. That's more transport congestion, et cetera, et cetera.

And I think in that respect we become more environmentally friendly. We are environmentally friendly, but the government also puts money in it and develops this much further.

Well, you know the White Paper. You can pursue it. There was a lot of talk about it yesterday. Well this is, of course, very important, shifting the balance between modes. Yes, of course, we like to hear that. We are only starting in the European Commission about it, but it's very important that they say it. Five or ten years ago they didn't say it. But when we proved that we are competitive, and we are successful, and we're absolutely sure, the politics will follow.

Well, you notice this map again. You see the connection between the Rhone and the Rhine, the French track, this connection, which is not logical. The big problem is the fact that how can we be reached from Northwestern Europe, Italy, et cetera. And it's absolutely clear that when you have the possibility to sail on inland waters to Meuse that the reach of Italy is much easier. So, we hope we can win this battle.

But because of pressures of two phases, the minister who came from the region was "not in my backyard." So, this would not be built. And secondly the Minister of Transport of France was one from the union of Rail Workers. So, we have to wait for a new minister of France.

We are pretty sure that there are very good chances for the future of inland shipping. Lots of work is to be done. That's absolutely clear. The interest is not in all countries. We hope in that respect that inland shipping makes it clear to the world that inland shipping is not only a regional situation, but an integral part of logistics.

And we hope very much that we are able to work together with our sister organization to make clear to the world inland shipping has a future, not by complaining, but by being strong and making our message clear and to everyone who wasn't here. Thank you.

Panel 3 Discussion

Mr. Cook: We have a few minutes. We're running over, but we want to take your questions at this time. Who wants to be first? I was intrigued by comments yesterday. I think Karin was talking about the alliances between barge operators and truck operators. And you mentioned today, Mr. Roos, that some container barges were owned by trucking companies. Is that right? Could you elaborate for just a minute about the alliances between trucking and barges?

Mr. Roos: Well, in our country the trucking firms, of course, transport for our country, and it's a very important trade. And also road transport certainly is quite strong. But the start of those trucking companies was on water. They started on water and went to land, and now they are coming back.

So, the big firms in our country said about five or ten years ago, how do we get to the ports, how do we get to Rotterdam? How can we get there without congestion? And they made it clear that they thought inland shipping was the best solution to that. And so many trucking firms started container terminals and, of course, connected to them using vessels. So, they are much more involved. They are not only thinking in tire or in kilometers of asphalt, but they are thinking as more logistical integrators. And that's a big difference in their thinking.

And also behind those companies are big German companies who have lots of contacts with the industry. So, this is the real start. It's not from the inland shipping itself, but the merger of those interests that make it possible.

Mr. Cook: It's a by-product of road congestion?

Mr. Roos: Of course, enterprising of it is the real start, yes.

Mr. Cook: Questions? Charlie, you have one? Tell us who you are, Charlie.

Mr. Lehman: Charles Lehman. I want to congratulate. This is one of the best panels that we've had. It's a great panel. But I just wanted to ask Bob one question. On the 33 percent growth that you showed, is that ton-miles, or is that just tons?

Mr. Pietrowsky: That's in tons, and that's unconstrained. So, weather delays or other congestion would actually result in some kind of modal split, that would be different, and some traffic would be diverted and would have to be still analyzed. But it's still a significant comparison when you think about 20 years.

Mr. Lehman: Thank you.

Mr. Cook: Tom.

Mr. Wakeman: Tom Wakeman. Mr. Doyle spoke of modifying the BC ration equation. That that current equation is applied to waterways and doesn't apply to other modes of transportation. He also spoke, and I think Harry spoke of a variety of other potential parameters in that equation. Is IWR doing anything to evolve beyond our current principles and guidelines and is that something we could offer to Congress?

Mr. Pietrowsky: There is actually a lot going on. And some of it is in the form of pilots, the way Harry described. I remember a national waterways conference I think two years ago where I did a presentation on innovative methods of evaluating inland navigation benefits and things like emissions and the impact on highways and roads if traffic is diverted.

These are beginning to be quantified and are beginning to be applied on a case study basis by some districts and studies across the country. Likewise, there is a similar effort

on deep draft navigation. And we've been working with the North Atlantic Division on the same kinds of innovative methods on deep draft. But it's a slow process. There are not a lot of resources available for the Corps to pursue this.

One hope is, just this week IWR and headquarters met with the National Academy of Sciences. They have a committee focusing on planning analysis. And there may be some recommendations flowing from that that could encourage some improvements, some modernization. It may be an incentive for some funding to do that. So, I think we're moving in the right direction, but it is slow.

Mr. Cook: Yes, there are such topics as social well being, regional development, water compelled freight rates, a big subject there, other benefits that flow from the waterway program besides just national economic benefits.

Mr. Pietrowsky: And this isn't the most popular thing to say, but there is a double edge to the sword. The fact that deep dredge vessels are bringing in more containers that could result in more road traffic is another impact that we would think would have to be quantified, if we're going to be consistent. And there is some concern over that.

So, it's not all a good news story. It's a complicated story, and it may not always be a winning story, depending on the situation. But it is being looked at.

Mr. Doyle: Harry, let me just say that whatever we do, I think it makes a lot of sense for us to be re-looking at 20-year-old system for formulating project benefits and costs.

But whatever we conclude with respect to that issue, whatever ability we identify to be able to put numbers next to factors that aren't currently being considered, I think it would be a major mistake for us to limit our marketing and our ability to tell the positive story just to those formulas.

Because in the political realm, common sense does continue to work, believe it or not, in many instances. People know intuitively when there's a problem that has to be dealt with, and a situation that represents progress that needs to be made. And our inability to place a number on that is not and should not be a barrier to continue to sell these kinds of projects and these kinds of programs with those other arguments.

Mr. Cook: Perhaps it is time, John, as you suggested, to consider another national water resources policy and a national waterways policy commission to review these subjects. There is going to be a national conference this fall sponsored by the American Water Resources Association. Gerald Galloway is spearheading the effort to look at all aspects of national water policy.

This lady over here has been trying to get the floor for about three minutes.

Ms. Johnson: Peg Johnson is my name. And this is for Mr. Roos. I think I may have missed it, but you mentioned that your waterways are free. I'm wondering how they are

paid for, their maintenance and operations? How are they financed, especially when you have such a complicated intracontinental system?

Mr. Roos: Well, it's a difficult problem. The EU is not the USA. But, for example, in our country, it's political decisions, and political pressures which dictate how much money is spent for inland shipping for the canals in Germany. There are some fees for the canals, but only a small part is paid. In Belgium it's also small dues, not very high. In France, well, there's not that much investment there. The French waterways receive money not only from inland shipping, but also from the electricity firms and international shipping. So, in that respect, the French system is quite interesting, and maybe this will be the future for Europe. I'm not sure about it, but big interests other than inland shipping pay for the waterways.

Mr. Cook: Thank you very much. Our time has run out, but we're going to take a couple more questions. One in the back.

Mr. Russo: Hi, my name is Edmond Russo, Operations Manager, Operations Division in the New Orleans District. We had a number of discussions about how to pay for construction and maintenance of waterway projects. There is, of course, the component of lock operations and so forth and maintenance, but also a huge component is dredging of the channels.

And it's always, a penny saved is a penny earned. And with the rising costs of dredging the channels, it's noteworthy to look at both sides of the equation: how to pay for those, but also how to look at the rising costs. And those costs are generated from a number of different areas.

One would be that more and more we are being requested to maintain the channels with a lot more emphasis on increased reliability. That's a real challenge because it drives costs up geometrically.

Another reason is that with environmental considerations, we are under a lot of pressure to beneficially use the dredge material. That drives the costs up. And in addition, there is a restriction in the competitiveness of dredgers internationally. Only American companies can dredge, so that limits competition. The supply and demand, there's a large disparity between those, and that's another force driving costs up.

There is not much incentive for U.S. dredging firms to add to the dredging fleet, nor to increase plant capabilities of the existing inventory. And for projects we have to maintain a higher rate of reliability as well as face increased requirements for beneficial use. Those are very important considerations on the cost side.

Mr. Cook: Valid considerations. Final question. John Pisani.

Mr. Pisani: I have a recommendation I'd like to present to the panel. You all spoke about the comparison of Europe and the United States, with more people, more congestion, and less space.

One of the areas I think John Doyle spoke about is trying to get the public to recognize really truly that if all the bulk commodities you spoke about, and now even containers, have to continue to move over our roads, and even rail, there's so little that's been done in the area of showing the environmental impacts of shifting all that cargo to the road system.

There has been some research done, but why doesn't PIANC and the U.S., John's organization certainly, Harry, yours, and many others, the Institute for Water Resources, combine in one effort to put all that together and document it. It's been fragmented, and there is a need for that.

Our Congress and even our legislators, politicians, pay attention when they see those numbers. What would occur if we didn't use the waterways and all of this material had to be shifted, and what's the impact on air pollution, and what's the impact on the roads, and all the environmental impacts?

And clearly there's an effort where I think Europe and the United States need to take the lead. And everything is there to do it, but no one seems to want to bring that together.

So I would really make that a recommendation of this conference that such an effort be undertaken. Thank you.

Mr. Cook: Good recommendation.

Mr. Doyle: John, some part of our story, our Waterways Work story, is the beginning of demonstrating that case. You saw some of the slides, for example, that Les used, that had that string of trucks, the 9 billion plus gallons of fuel that would be saved, the additional amount of air pollutants that would be put into the environment.

So, some part of our case involves trying to sell those issues in understandable terms, but clearly more can be done.

Mr. Cook: Well, thank you very much. We could go on with our discussion the rest of the morning, but unfortunately there's another panel coming up in a few minutes. Before we adjourn, I want to introduce a member of the audience who's joined us during our discussion, former Chief of Engineers Val Heiberg. Val, would you take a bow?

I thought the discussion raised today a lot of interesting questions, and our panelists will be available during the rest of the day to answer your questions. Give them a big hand.

Introduction to Panel 4: Advanced Technologies

By Mr. Walter D. Ritchie, Vice President, KPFF

Welcome to this fourth and final panel session. I'm Walt Ritchie. I'll be your moderator today. In the three previous sessions we've heard repeated references to the importance of research and design as an integral component of a national maritime program.

We've heard references for the need to develop creative solutions as the inland and coastal navigation elements continue to compete with other modes of transportation to capture a greater percentage of the cargo flow. And we've heard adjectives including effective, efficient, competitive, dynamic, environmental responses, secure, and accountable used to describe these required solutions.

Jeff, I got most of your adjectives in there I think. In this session entitled advanced technologies, we will be exploring innovations in inland and coastal shipping within Europe and the United States. In addition we will be looking at the role of the public and private sectors in affecting research and technical innovation.

Our panelists, Mr. Thomas Menzel, Chief Executive Officer for the Waterway Construction Office in Magdeburg, Germany. Mr. Rolf Marshall, Executive Director of the Washington, D.C. based Coastwide Coalition. And Mr. Henk Schroten, General Manager of the Rijkswaterstaat for south Holland.

Each of these individuals are experts on these topics and highly qualified to present their thoughts to us on these subjects. These topics are particularly timely. Sadly as we have heard today R & D funding is virtually non-existent and with the reduced budgets and competing priorities, relief is not in sight.

Innovations in Inland Ports and Shipping in the European Union: The Waterway Cross at Magdeburg, Germany

By Mr. Thomas Menzel, Baudirektor Dipl.-Ing., Wasserstrassen-Neubauamt Magdeburg

Ladies and gentlemen, I enjoy having the opportunity to give a short talk on the waterway crossing in Magdeburg to you. Walt, thank you for putting me in such a good light with your introduction. It's not only my German type of accent, my school English is a bit rusty. So, I hope you will bear with me and find some interesting facts in my presentation.

First where do we find Magdeburg on the map. Magdeburg is a city of about 230,000 inhabitants in the former East Germany. It is a city with an old history, and it made history. On the slide we see Emperor Otto, II and his empire from the North Sea to the Mediterranean. In the 10th century he was the first ruler over a European entity and Magdeburg was his favorite capital.

We see the River Elbe in front of the Magdeburg Cathedral where Otto, II was buried. At that time rivers were the main, almost the only traffic carriers for people and goods. The waterways in Germany are formed by the large rivers Rhine, Ems, Weser, Elbe, and in the very east the river Oder. These rivers roughly flow from the south to the north. They were no longer single traffic lines, but became part of the waterway network when canals were built. 70 percent of all German cities with over 100,000 inhabitants are close to a waterway.

In this respect there have to mentioned the Main Danube Canal which links these two southern German rivers, and thus makes shipping possible from the North Sea to the Black Sea and the Mittelland Canal as the main east west link in Germany. The aim of the Mittelland Canal is to connect the areas of Berlin, Magdeburg, and Hanover with the major North Sea harbors as well as the industrial heart of West Germany, the Rhine Ruhr area. Starting in the west at the river Ems and moving forward to the east, the early parts of the Mittelland Canal were built between 1906 and 1938.

By finishing the ship lift in Magdeburg in 1938, the canal met the river Elbe. Originally the canal was designed with a surface width of 33 meters and a depth of three and a half meters and was to be used by rather small vessels only. Since 1965 the Mittelland Canal was being widened and deepened in order to make modern ships and push tows. Today up to 90 percent of the 320 kilometers of the Mittelland Canal are ready for the big inland navigation.

The biggest seaports for the German inland waterways are in Belgium and in the Netherlands. And the first place Rotterdam. Perhaps we will hear more about it from our next speaker, Mr. Henk Schroten. In long distance haulage about 1.4 billion tons were being transported in 1997. A comparison: if the whole volume of freights were loaded on trucks at the same time, they would stand on a 45-laned highway bumper to bumper around the equator.

Some 80 percent of the overall volume of traffic of German waterways takes place on the River Rhine alone. An increase of the transport volume by 23 percent was recorded between 1991 and 1999. Considering the individual traffic carriers, this means for the roads a disproportionate increase, for the waterways at least an increase of about 12 percent and for the railways a real minus.

There will be a tremendous growth of commercial traffic in the perspective until 2010. Most of the cargo will be moved on roads. Railway and inland navigation will still make up only a small part.

We can see the development of the individual traffic carriers of Germany on this simple slide. The same abscissa and nearly the same ordinate. The ordinate not in absolute numbers, but in percent. You see the importance and the priority of the trucks. Our job is to make a change in this development possible.

At the time of the reunification of Germany, traffic and transportation projects were developed. The intention was to closely connect the traffic infrastructure of both German countries. This new infrastructure was to be a basis for the economic development in the former East Germany. The political intention was to support environmentally friendly traffic carriers, that is the railways and the waterways.

For the 17 traffic and transportation projects, a volume of investment of about \$38 billion dollars has been calculated. This investment will be funded completely by the German government over a period of about 20 years.

Among the 17 projects, there is only one representing the system waterway-ship-port: the project number 17, the link between Hanover, Magdeburg, and Berlin. For this, an investment of about \$2.3 billion dollars is necessary.

Let us have a look with a magnifying glass. In the very west we guess the city of Hanover. In the middle we see the waterway crossing between the River Elbe and the Mittelland Canal. And in the east we find the capital of Berlin, the end of the project. In the very east, we notice the River Oder with the border to Poland. Perhaps there will be another challenge with the expansion of the European Union.

Keyword European Union. We've heard a lot of the TEN. I'll make it very short. The TEN as well as the transportation project number 17 can be supported by the European Union on request. There is a limit of support at ten percent of the total investment. Only projects with guaranteed main financing will be supported. European

Union acts and guidelines must be kept, especially the Fauna Flora Habitat Guidelines and the Antitrust Act.

Construction operation and maintenance of the about 7,300 kilometers of waterways in Germany are the responsibilities of the Federal Waterways and Navigation Authority, which is a part of the Federal Ministry of Transportation Building and Housing. The funding of the waterways is financed completely by the government.

In 2001 the cost for the operation, maintenance, and investment amounted to \$0.9 billion dollars. The about 15,000 members of human resources caused costs of about \$0.6 billion dollars.

As mentioned before, there were plans to build a construction to lead to the Mittelland Canal as a bridge right over the river Elbe in the area of Magdeburg as early as in the 1930's.

They had then already started to build a 1,000 meter long aqueduct. In the section of the Foreland Bridge three-link-bows consisting of concrete were set up. The bridge over the river itself should have been a steel construction. However, due to World War II, the construction had been left unfinished in 1942.

On the left we see the construction site of the Foreland Bridge planned and built in concrete. This a photo from the year 1939. On the right we see the situation in 1995. From above we see the Mittelland Canal coming, still waiting to cross the river Elbe.

Today in order to get from the Mittelland Canal into the Elbe-Havel Canal and further on to Berlin and to Poland, ships have to take a detour. First they need to pass the ship lift Rothensee to reach the river Elbe. After that, they travel downstream to take the lock Niegripp for descend into the Elbe-Havel Canal. This route is 12 kilometers longer than the direct crossing.

Moreover big vessels cannot use the ship lift Rothensee, which is only 82 meters long. Yet, the main problem for the cargo vessels is the often low water level of the River Elbe. It can happen that for several weeks ships coming from Hanover have to lighten in Magdeburg. And quite often, the entire shipping is closed down.

Under these conditions, inland navigation to and from Berlin is highly uneconomical. This traffic route is not reliable for the ship owners, which is a considerable disadvantage in competition.

After checking alternatives, the former Ministry of Traffic decided on the solution of an aqueduct in connection with a double lock east of the River Elbe to descend to the Elbe-Havel Canal. The slightly cheaper solution including a dam and a lock in the River Elbe, to make the shipping independent from the low water level throughout the year, had been rejected.

The reason was the far larger infringement on the environment. Such a solution would have created difficulties in the social acceptance. In the profitability analysis, one year of delay would have cost about \$100 million dollars.

The Magdeburg ports will be linked to the east west waterway connection through the new lock Rothensee as a bypass to the older ship lift to make the passage for modern large vessels possible. Since May, 2001 Magdeburg ports can be reached by modern ships as long as 185 meters, as wide as 11.4 meters, and with a draught up to 2.8 meters. Those ships may transport up to 3,600 tons.

In the east west waterway, a single lock to descend to the Elbe-Havel Canal is insufficient. At this point a double lock is being constructed. The Aqueduct, the double lock, and the connecting canals are still under construction. Traffic will be opened on this central part of the traffic and transportation project on October the 3rd in 2003 at the latest, the anniversary of the German reunification.

This talk is part of panel 4, advanced technologies. I will show you our very first and enthusiastic plans. You see our fantastic highway crossing for ships. It was the outcome of some good ideas under the influence of the Christmas party in 1998.

After giving an overview, I will show you some special features on the construction of the waterway crossing. First the aqueduct over the River Elbe. The aqueduct is predominately loaded with the weight of water. The decisive weight is determined by constant weight of water and construction material.

Furthermore, there are wind and traffic, possibly a ship sinking to the bottom, a bump by a ship, pressure by ice, and an earthquake. You wouldn't believe it, but we had an earthquake in the 17th century. You can read in the Chronicle of Magdeburg that because of that, chickens fell off their roosts.

The demands of differences of the temperature within the construction caused the biggest difficulties. When the trough is empty, the construction must tolerate differences in temperature of more than 50 degrees celsius.

The Foreland Bridge as well the River Bridge are going to get a trough made of steel each in one piece. The thickness of the metal sheet is up to 80 millimeters. The troughs weigh about 24,000 tons in total. That is about 10,000 tons for the River Bridge and 14,000 tons for the Foreland Bridge. Only the welding material amounts up to 435 tons. Both troughs are being delivered to the construction site in about 250 segments. The heaviest part weighs about 150 tons. At least the parts for the Foreland Bridge have been transported by ship and not by truck.

The River Bridge is about 228 meters long. For the shipping on the River Elbe, the span is about 106 meters wide. It is 6.5 meters above the highest water level. That passage is possible for ships with three containers on top of each other. The main outside girders of the troughs are about eight meters high and four and a half meters wide. With a

water level of 4.25 meters in the troughs there remains a height of only 1.9 meters for the construction of the cross girders.

On the outside of the main girder, there is a steel framework. The inside of the main girder consists of a closed steel wall. This is the skin plate with water behind. This construction creates a lot of difficulties in structural calculation. The stiffness, for example, is different inside and outside. Thus, the bearings must be put out of the center of the girders.

This is the reality. We see the steel framework, the piers, and a couple of little towers. Some have said that we could have got a straight bridge for the money. But think of the water weight of about 150 tons per meter. We definitely need an .5 meters higher bridge in the middle of the piers when the trough is empty. This camber is necessary to avoid a deflection in case of a water filled bridge.

It's a talk of its own to describe the 24 hour moving or launching of the 10,000 tons River Bridge across the River Elbe in time of a high flood on the river. So, it's only an impression. The Foreland Bridge is about 690 meters long. This is necessary to ensure the cross section for the River Elbe in case of flood.

Another idea worth remarking: the bridge is made of steel of about 1,000 meters long. It is about 1.5 meters longer in summer than in winter. The linking construction is made in profiled rubber material in form of an omega, larger in summer and smaller in winter.

On this slide we see the piers of the Foreland Bridge made of concrete. When you look upon the shape, what does it look like? Our aqueduct shown in a watercolor painting is not only an extraordinary technical construction, but also makes its impression on the country's scenery. This is why the architectural design is very important. Right from the beginning the architect and the engineer have been working closely together.

There are three special design features. The two ends of the aqueduct are marked by a couple of little towers each in front of a prism, as is the division of the River Bridge and the Foreland Bridge. The steel framework of the girders avoids the impression of a rebuffing eight meters high, closed technical construction. At the same time it is a bow to the design of our ancestors. The piers of the Foreland Bridge resemble a ship rib. So from a distance, the purpose of this construction can be recognized.

As the construction and owning party, we did not alone decide on the color design of the construction. We called in the decision of the adjacent municipalities, the rural districts, and the capital Magdeburg. As the region sees this junction as a blue cross, the decision was for a blue aqueduct to match. You see our logo.

Because of the possible large distortion of the super structure, spherical bearings are necessary for the River Bridge. With a weight of 13,500 tons per bearing, we have to

manage an obstacle. It is the largest bearing in Germany, and there is no standardized bearing for this weight.

In this case we need a permit for this isolated case. The authority who gives this permit is the Federal Ministry of Transportation, Building and Housing. A group of experts defined the demands and the standards for this bearing. The expert group was composed of the producer of the bearing, two University Institutes, the Federal Waterways Engineering and Research Institute, and our Senior Engineer, Professor Hering from the University of Braunschweig. You see him with his camera on the slide. He is responsible for observing the building regulations.

One problem, for example, was that the sliding plates of teflon, the material of the slip surfaces could not be delivered in one piece. The material had to be put together. You see it on this slide. The question was whether this compound can be kept in good condition over the prospective period of use of about 80 years. The experts decided to carry out an experiment. A model of a part from the bearing on a scale of 1 to 1 had to be built.

At the University Institute at Stuttgart, this model was loaded with a weight of 35 Newton per square millimeters and was moved for a distance of about two kilometers. This stretch is more than a bearing should move in its prospected period of use. The experiment ended successfully, and we received the permit.

Because of two experts, we needed the help of the University Institutes. First the experience and second the equipment for such an experiment. We decided to use this type of spherical bearing for the Foreland Bridge, too. Experiences with hot bearings at other aqueducts in Germany have not been truly and really convincing.

We had to change some bearings there after only 25 years in use. We do not know yet exactly what this damage was caused by. All the evidence seems to indicate that this is not only a problem of the type of the bearing, but also a problem of the superstructure just above the bearing. It looks very much that's if it is too soft at this point. Thus, we got peaks of pressure on local parts of the bearing which destroyed them.

But there is another obstacle. In the case of a waterless trough and sunshine at the same time, the super structure takes off from the bearings which would damage them. So, this case must not happen.

We decided to build a construction to put down the super structure to prevent any negative pressure. The whole system is very sensitive, and a damage would be very expensive because it's highly complicated to change a bearing. That is why a measuring of the pressure in each of the over 100 bearings is absolutely necessary. There did not exist a method of measuring the pressure in the curved surface of the spherical bearing. The producer developed this measuring technique.

And by now a patent has been granted for this. A welcome side-effect of the measuring is the early recognition of possible impending damages.

Another subject, the double lock Hohenwarthe. What do you think about it? It looks like a super playground for grown up engineers, doesn't it? We heard a lot of environmental impacts. On this slide we can see one. About 50 acres it was only sand. The spending for the compensation at the waterway cross amounts to about three percent of the technical investment.

This is cheap in comparison of segments of widening a canal in the middle of a city. There we reached up to 30 percent of the technical investment.

The double lock Hohenwarthe at the eastern bank of the River Elbe enables ships to overcome the differential altitude of 18 meters between the Mittelland Canal and the Elbe-Havel Canal. The usable lengths of the new locks are 190 meters each with a width of twelve and a half meters. To reduce the loss of water, all ship locks in Magdeburg are designed as water saving locks. At each side of the lock, you can see three water saving basins of different levels.

With the help of these basins, we can save up to 60 percent of the water necessary for the entire operation cycle of locking. We want to build this lock a few hundred meters to the west. There is a homogenous underground and reliable construction would have been built. But at that site, the shelf of earth ends and, therefore, there is the danger of an earthquake. You remember the chickens? Thus, the development site had to be moved to the east, but there is a very inhomogeneous underground there.

Such an underground reacts very sensitively to the pressure from a lock, because there are not only rested weights, but also dynamic weights by operating the lock with changing water levels. Especially a layer of clay can get quite nasty. Its distortions are not elastic. A possible crack between the stiff concrete construction and the soil however is dangerous as the passage for water. Therefore, a robust construction is needed.

We decided to build a monolithic concrete bottom about 255 meters long, about 55 meters wide, and 5.5 meters high. We did not build a monolithic object without any joint up till now. But this new type of construction seems not to be safe enough. So we put the concrete bottom on 1,200 concrete piles each more than 12 meters long, in total about 17 kilometers. We received the shallow and deep foundation made up of a foundation slab and drilled piles.

Ladies and gentlemen, we need the social acceptance for the planning, for the permission to build, and for the building itself. So we include the public wherever and whenever possible. For example, you see the results of a painting competition in the schools of Magdeburg. This is the first prize picture. It is advanced technology from a child's point of view; only a friendly policeman with a swimming belt in the middle of the waterway cross.

For more information, have a look on our home page www.wna-Magdeburg.DE.
Jerry, thank you for your help. Thank you very much for your attention.

Innovations in the United States for Fast Coastal Shipping and Ports for Domestic and International Freight

By Mr. Rolf Marshall, Preston/Gates/Ellis& Rouvelas/Meeds LLP

Thank you all. And I'd like to thank everyone for the invitation and the opportunity to address you here today.

A quick overview. The Coastwide Coalition is an informal group that was brought together in Washington about two years ago out of the National Defense Transportation Association's initiative that identified coastwide shipping as a major opportunity for the maritime industry in the United States. The coalition is completely informal. Anyone who wants to join the coalition need only have an interest in advancing coastwide shipping. And all you need to do to join is contact me, and you are in. This is very easy.

What we wanted to do in the coalition was to bring together the stakeholders which you saw listed in the Washington, D.C. environment to form a forum and serve as a catalyst to get people thinking about coastwide shipping. That is really our sole mission.

We want to get the administration, the executive branch, and Congress thinking coastwide shipping as a real adjunct to the National Transportation System. We want to go from what is essentially a bimodal system in north south shipping on the coast to a truly multi-modal system.

So, our mission statement is relatively simple. Let's increase reliance on waterborne options in reaching our transportation goals of the next 20 years.

As I indicated, when you look at what's going to happen in the National Transportation System in terms of growth, we've heard it several times in the last couple of days. Unless the system operates to its maximum efficiency and gets the best out of each of the modes involved, we are not going to be able to accommodate the kind of growth that our economy needs for it to keep expanding.

So, we're advocating looking at water as an equal partner, at least in terms of attention, to increase the overall capacity and efficiency of the system, and to increase the options available to the American shippers. I think oftentimes in the maritime industry,

we tend to forget that the shippers are our customers. We need to listen to what our customers want when we start thinking about what kind of policies, what programs should we use. So, we have tried to make the shipping community an integral part of our Coastwide Coalition.

Just a quick look at coastwide shipping generally. Primarily today I'm going to be talking about intermodal coastal shipping; the ability to bring the waterborne option in to the container shipping trade.

However, I wanted to give just a quick overview of what is going on in coastal shipping. Generally this is an indication of where the trends are in terms of vessels greater than 1,000 gross tons. In other words, relatively large commercial cargo carrying vessels.

I'd particularly like to point out to you as a sign of the change, this data from '99 to 2001. On the top line of the coastwide, notice that the number of container ships went up while the self-propelled vessels went down, reflecting a change in the non-continuous trade. The number of non-self-propelled container vessels has increased by a dozen in just roughly that two-year period.

So, there is already movement going on in the intermodal area in coastwide shipping. What we want to do is simply capture and build on what is now going ahead.

This then, just quickly, illustrates the comparative growth in the coastwide trade. As I indicated, most of the growth that's been going on now is in bulk shipping. Roughly somewhat over 300 million tons a year moves in the coastwide and non-continuous trade. It's primarily all bulk material. But what we want to do is bring intermodal into the mix.

Growth is something that has been talked about. And I just want to show a couple of slides that we use to illustrate this to people who are not intimately involved in the transportation industry. That is part of our mission in Washington, D.C.: to go to the members of Congress, to go to people who don't think transportation, and try to summarize to them what it's going to mean to them when you say trade is going to double in the next couple of decades. You're going to have increased truck traffic.

This is a simple formula, a thumbnail sketch that assumes vehicle miles traveled increased by 50 percent for every five percent increase in gross domestic product. And if you assume that gross domestic product is going to increase at one percent a year, and we would like a lot more, what you're going to see is inter city trucking on the east coast increasing in miles traveled by a factor of four and a half in the next 20 years.

Another aspect of the coalition is we are great borrowers of work. We don't produce work of our own. What we do is we like to take studies that are done by other groups who are interested in transportation and integrate them into our thinking and see how coastwide shipping can play in the kind of transportation network that they are talking about.

The data shown here, for example, comes from a Mid-Atlantic rail operation study that was done in conjunction with the I-95 corridor; from a report issued in December of 2001. According to this analysis, which was primarily done by the railroads; Norfolk, Southern, CSX, some participation by Amtrack, and then by the I-95 Coalition, today roughly 10,000 trucks a day transit the I-95 corridor in inter city travel. By 2020 they expect there to be 58,000 trucks attempting to transit that same stretch of highway.

The Mid-Atlantic rail corridor could absorb about 25 percent of this growth or 12,000 trucks a day, if you are willing to spend \$6.2 billion dollars upgrading the railroads in the area from Newark to Richmond, Virginia. We will return to these numbers, but I like to think about this in terms of trucks per day because it's a number that people can start getting a grip on.

We once did an analysis, and we found if you're talking 10,000 trucks, it's about one truck every 270 yards between Boston and Miami. So, you can imagine how it starts crowding up.

The same thing you've heard is happening in international liner trade, when you talk about trade doubling or tripling in the period of time. This projection from McGraw-Hill estimates 16 million more TEUs arriving in U.S. ports each year, roughly a 95 percent increase. But if you notice, that analysis is only between 1998 and 2010. This is 2002. We're already a third of the way towards that number.

When you look at that trade growth alone in terms of corridor impact, you find that this equates to three fully loaded 7,000 TEU ships arriving on each coast every day in addition to what's already coming on to our coast. This would result, roughly speaking, in about 11,000 more trucks every day on every coast or about 80 or 60 additional intermodal trains.

And trade is a relatively small portion of the total traffic growth. You hear estimates that it is probably somewhere around a quarter of what contributes to total traffic growth.

Why waterborne? Here I'm preaching to the choir. I won't even read the bullets. Everyone knows waterborne is probably the best remaining alternative for us to bring into the equation.

What we are doing as part of our message is looking as I said at work that's being done in other areas or in specific localities and trying to pull it together and demonstrate what a more national picture would look like.

Most of our work here focuses on the I-95 corridor, in part because there's so much advanced planning in that area. The second part is we live there. The third part is

that the Congressmen who are going to be deciding this are there. So, it's a very good way to illustrate to them, because they see it in their day-to-day life.

But the same factors that you see operating here, and I talk about in the I-95 corridor, are true on the I-5 corridor. They're true on the I-10 corridor. They're true in the central Mississippi Valley corridor. So, the principles are the same.

And so if you're interested in the west coast as opposed to the east coast, just think the same ideas. It's just a change of locale.

We've looked at specifically three different models. One is the Port Inland Distribution System, Port Authority of New York. You've heard some discussion about that yesterday. I'll have a little bit more.

Paul from the Port of New York is Chairman of our coalition. I continually frustrate him because he's calling it the Port Inland Distribution Network. I call it PIDN. That's my Navy days.

Secondly there's a high speed ferries coastwide vessel study Dr. Hochstein has done for the National Waterway Institute.

And then third is rafting and existing services. There are existing container-on-barge services operating up and down the coast right now. Columbia Coastal Transport, for example, transports roughly 200,000 containers a year up and down the U.S. east coast. So, the basis of coastal trade is there.

If you look at the east coast and put all of these options together, you can see this kind of a network system developing. So, we're not looking at just simply one form of coastwide transportation. We're really looking at bringing a whole mix together.

We're looking at relatively regional systems such as the New York Distribution System. We're looking at inter-regional systems such as the Coastwide Loop System that Dr. Hochstein described. We're looking at regional systems such as the existing coastal system.

One thing that I'll just point out here from the aspect of ports: we were hearing talk the other day about 206 deep water ports. One thing that coastwide shipping does is it provides a means by which ports can alter their role and still maintain a viable commercial base. And we feel that that is an important aspect of it. As people said, not every port on the U.S. east coast is going to be the size of the Port of New York.

On the other hand, if waterborne becomes a true alternative or a true player in the distribution system, then the ports that are not getting containers by water from the long haul ships from Europe will ultimately be handling that same container when it comes off a coastwide vessel.

Here are just a couple of the illustrations. Obviously here are some container and barge operations. This is a roll-on/roll-off intermodal ferry of the type that you could look at in Dr. Hochstein's type coastwide operations. And here then, of course, is, you know, the future.

As I indicated, a number of these services are in existence. They're showing in green in this chart. The ones that are in blue are the kind that are being studied now. And the purple 40 plus knot ro/ro are sort of the let's see how far we can start to push the envelope.

Really, water offers options for reducing congestion, mitigating congestion both in the ports and on the highways. The key to ports is let's not let that container sit on the pier. If it gets on the pier, it starts becoming part of the congestion.

Ideally that container ship would be loading directly onto the container barge on the water. This is vitally important to ports such as New York that are geographically limited. They can't grow inland anymore. The only way they can handle more containers is to make sure that each container spends less time in the port. And water offers a great opportunity for them to do this.

If you look at the outcome or the projections of the Port Inland Distribution or PIDS study, New York projects its growth. And this is in terms of 44 percent equivalent units per day from 4,000 to roughly 12,000 over the next 20 years. Its' current mode of distribution sends 80 percent of that out of the gate by truck, roughly 11 by rail, and 3 by water.

Illustrating how change is occurring, though. When we first did this slide two years ago, the water was zero or so near zero, it computed zero. There is already again movement in the right direction. New York would like to get to a low distribution modal mix which is shown at the bottom of 38 by truck, 23 by rail, and 39 by water.

I think it's an interesting point that where New York wants to be in 2020 is roughly where Rotterdam is now in terms of how much is going out by water.

There's also another point here, though, that we always make and particularly in the context of Washington, D.C. politics. You've got to keep the highway people roughly on your side. Where you don't want them is on the other side. And we point out to them that when we're talking about improving the efficiency of the system with distribution models like this, that the number of actual truck moves is still going to go up. There's going to be a significant increase, and they're almost, you know, a thousand more. They're increasing by almost 30 percent more per day themselves.

So, it's not that we are taking moves away from the trucking industry. The trucking industry is going to have to grow in its infrastructure as well as our own. But what we are doing is we are providing a better means of distribution throughout the region.

So what you'll see is that the number of trucks moving out the gate is going to increase for the Port of New York. The number of truck miles traveled in the region distributing that cargo will be significantly reduced if you bring rail and water into the mix.

The Coastal Loop Service, the Dr. Hochstein study, is based on groups of ships operating. They have roughly five vessel sets, 25 knot roll-on/roll-off vessels to provide daily service. They anticipate for each set of those vessels to be moved roughly 110,000 truck segments a year or about 300 a day. Now keep that number in mind; 300 a day 58,000 a day. So, there's a lot to work with there.

Here are some of the -- this goes back to the analysis that was done by the railroad. And if the railroad indicates that it could take 12,000 out of growth, that would still leave 40,000 trucks on the highways.

If water could step in and pick up 6,000, we would make a real contribution to it. But for water to move 6,000 trailer equivalents a year, you're going to be looking at a number of vessels. Here is the reduction in vehicle miles traveled as I mentioned before. That slide should be one of the earlier ones.

But that shows when you bring rail and water into the mix, they anticipate a 73 percent reduction in miles traveled within the New York distribution region.

Obviously, there are environmental benefits that are associated with this. The main one is increasing the throughput of existing ports without increasing the size of the port, which is important, or without increasing dredging requirements.

By and large coastal intermodal vessels can operate within the dredging model created for international trade. We're talking vessels 15 to 20 foot draft. So, if you've got your 45 feet or your 50 feet for the international trade, you will not have to do significant additional dredging.

The other side of it though is, of course, that we're meeting increasing transportation needs with a reduction in vehicle miles traveled generally. We use more fuel efficient assets, and we reduce emissions.

Jumping back, if you were looking at trying to move 6,000 trailer equivalents a day, well you would have to be looking at somewhere in the neighborhood of 20 to 50 trailer vessels in direct commuter service from New York to Miami. You would have to be looking at roughly twelve sets of the 25 knot roll-on/roll-off vessels such as in Dr. Hochstein's study, and then roughly 18 times the number of days to deliver for barges. So, you're looking at significant numbers of vessels that would have to be brought into play to produce that kind of result.

Technology. Since it's the subject of the panel. What you've been hearing up till this point is a history major talking about technology. There are really four areas in which technology needs to be looked at to advance coastwide trade, but the core of technologies are really there.

The kinds of vessels, for example, that we're looking at using or that would be employed are already employed in other places in the world. They're being built in other places. So, it's not that we have to make major significant advances in technology.

On the other hand, what we have to do is find a way to harness technologies, tune them to our specific needs, and then produce them inside an economic model that enables us to compete with trucks and the railroads.

Here are the service parameters for Dr. Hochstein's study. This is probably a good place, in case you're trying to copy all of this down. This presentation should be available on our law firm's web site probably a week to two weeks from now. So, if you'll go to the Preston, Gates, Ellis web site, check the Washington, D.C. office, we have a section of presentations. And all of our Coastwide presentations are there, and this one will be added. Like I said, it will probably be a week or so from now. So, you'll be able to get the presentation directly.

One of the points that comes out of this data, though, is that water, in a sense of being able to compete with trucks and rail in the matter of costs in the matter of timeliness, is close. I mean we are almost there.

If you look at the models that Dr. Hochstein has in his study, the two red squares are the two primary trucking options, a solo driven truck and a team driven truck. And if you look, the 25 knot monohull roll-on/roll-off service is roughly competitive in theoretical terms with the solo driven truck. The 36 knot Catamaran options get up into the area where they're competitive with the team driven truck.

So, years ago people had been concerned about closing this economic gap. Now, what's happening is the paradigms are changing. Roads are becoming harder to move on. Their times are dropping. Drivers are becoming more expensive. Their costs are going up. At the same time, our highway is wide open. And so we've got the option to get in if we can start capturing some of this.

One initiative that I think will happen, there's some opportunity here, but it is admittedly a double edge sword, is the fact that the U.S. military has now suddenly in the last two years developed an interest in high speed vessels. What you see here is high speed vessel X-1, which is currently a charter version of a 95 meter incap produced high speed Catamaran that the Australian Navy used in its peacekeeping operations. The U.S. military is currently evaluating this for any number of missions.

And our sense is the Army, I believe, has plans to purchase somewhere in the neighborhood of 12 to 14 such high speed vessels for inter-theatre transportation. This

may be the kind of kick that we need to get commercial production of similar vessels going.

And a key aspect of it is the range. So many currently designed vessels in short sea shipping tend to have ranges in the 250, 300 and 500 mile range. If you notice what the military is looking at is 2,400 nautical miles. They have already taken this vessel back and forth across the Atlantic to support exercises in Norway.

So, that would give the commercial vessel the kind of range it needs to serve from New England to Florida. As I said, that is a double edge sword.

Just a quick comment. The other edge of that sword is historically that when U.S. shipyards start building for the government, they tend to become uncompetitive for building for the commercial sector. So, the challenge is going to be not to let government contracts become the poison apple in this option, but let it become the way for them to gain the technical experience.

Another area of technology that is essential in coastwide shipping is the mode transfer issue. What I've illustrated here is based on a MARAD study about four or five years ago, but the message is very true.

Transferring modes costs a lot of money, and it's one of the primary reasons why we're having trouble developing coastwide intermodal shipping right now. This model, for example, assumes if you're doing a lift-on/lift-off service from a line haul vessel and lifting it off either on to a truck where you notice the red line is almost invisible or to a rail where it's a limited amount.

Or if you have to do a traditional lift on to the shore, then you do another containerized lift. So instead of doing one, you're doing three lifts. The red shows, you know, how much of the total costs for a 500 mile mode is taken up by that kind of transfer costs.

The same thing happens at 1,000 miles, and this is one of the reasons why, when we were looking at the models of vessels earlier, you tended not to see lift-on/lift-off other than in the container barge situation.

Unless we can find some way to really drastically reduce the mode transfer costs for a lift-on/lift-off operation, roll-on/roll-off is going to be the technology that is going to be the driving force in the coastal trades.

Fuel efficiency. We've seen these numbers as well as pollutant production. But one point I want to make, one of the things we have done is met with the environmental groups.

While marine is great, we're good, we're better compared to the other modes. And we must be careful not to get to resting on our laurels. They still want us to look at what

pollutants we do produce. And you have to admit that the maritime industry does produce some. Unfortunately our friends in the international trade love to bring those big container ships into our ports, sit them there for 24 hours with those big diesels turning over slowly and churning out all sorts of stack gases.

Similarly, we need to look at the efficiency of our prime movers. Marine diesels are highly efficient, but can we make them more environmentally friendly? The environmentalists are interested in this. They want to support us, but they want to make sure that we are also sensitive to that.

And the third is the operating procedures. Can we technically get to the point where you don't have to idle that diesel, you know, for the 24 hours while the ship sits there?

Conclusion. Our sense at the Coastwide Coalition is that we're truly on the threshold of a new era in coastal shipping. It was the original needs of transportation between the colonies, and we feel it can be an important player in this next century.

The demand is growing, and the economic models are changing. The policy opportunities are there. TEA-21 re-authorization is probably only the first, but a major chance for us to get recognized as a partner in the transportation system. And MARAD and the people at the Marine Transportation System are doing an excellent job of bringing water into the equation.

The last question for us as the maritime industry, though, is can we deliver? Can that list of stakeholders as you saw in my second slide, all twelve of us or whatever, twelve segments, can we for once actually cooperate and bring together something that is going to produce a tremendous benefit for the country and for our own industry? But again we're going to have to work together on it. Thank you very much.

Recent Developments in the Field of Inland Shipping in Northwestern Europe

By Mr. Henk Schrotten, Hoofdingenieur-directeur Rijkswaterstaat, Directie Zuid-Holland

Thank you very much. You surely have put pressure on me because I've got minus ten minutes I think. Anyhow it's a pleasure to be here as a guest of the Army Corps of Engineers because like Rolf said, I've worked for 35 years already with the Rijkswaterstaat which you might consider to be Civil Corps of Engineers.

In history there are quite a few examples of cooperation between the Army Corps of Engineers and the United States of America and our civil corps of Rijkswaterstaat in effect. At the moment, a new memorandum I understand is in preparation, and we hope

to sign that in a few months' time. So, we have a lot of things in common. If not only problems of the management of water systems, with all kinds of problems we have there.

But today we are talking about recent developments in the field of inland waterway transport in Northwestern Europe. And I should like to tell a few things on strategies in traffic and transport, a little bit about container transport. And finally we'll end with some new developments in the field of relevant information services.

If you want to make strategy, you must have some idea of the future. And that's why in our most recent national policy plan for transport and traffic, we made three scenarios. You see the DE. That means Divided Europe. The second one is Europe Coordinated. And the third one is Global Competition. You see competition leads to the best results.

Anyhow if you take the middle scenario, even then you have an increase in transport of 50 percent, and as you know, road infrastructure and rail infrastructure is limited. You have to increase it, and that's not very popular because of costs and effects on the environment. You have to look at possibilities of inland waterways. Even government knows that now.

But not only in Holland, but also you have to consider Rotterdam as it is not a Dutch harbor, but a European harbor with all the hinterland connections. You see here a map of Europe at the northwestern point is Holland with its Port of Rotterdam. At the right side of the map is the Black Sea. And there's a river system connected from the North Sea to the Black Sea, only you can't navigate it. So, you have to improve that to make more inland waterway transport possible.

So, it's very good to mention that there was an initiative of the Ministry of Transport of Romania that's bordering the Black Sea and the Minister of Transport of the Netherlands responsible, of course, for the waterways in Holland and the connection from Rotterdam inland to have a conference in September last year.

There were, in fact, more attendant European countries that had a part of this inland waterway in between the borders. There were observers from the United States and Asian countries. And there was decided to do something about that connection.

And then you have to look into the different regulations of different countries. And there you see a whole array of regulations. So, you have to standardize that, and that's a lot of work, but that's going to be started.

Also, there's a recommendation for our own European global positioning system that's going to be developed. And in effect in Barcelona this year on a recent ministry conference, it was decided to develop that kind of positioning system. So, it's very important to make uniform regulations. That's the first solution.

And, of course, you have some standardized infrastructure as well. The measures of our locks for example.

Now, we go to our own Dutch policy. As I said, we expect tremendous growth in traffic. And our aim is not the average of 50 percent on inland transport, but 75 percent. So, you can have less growth on roads and railroads. Despite the fact that we're also building railroads, we expect a lot of capacity of the waterways. And we say well, we have to facilitate mobility.

And there's a change in policy, in fact. Because still ten years ago the policy of the government was to lower the mobility, especially on roads, but now we facilitate. But we say we have to think of very clever methods of using the existing infrastructure; electronics, better data exchange, and so on.

You have to pay for the use of infrastructure but only for the roads; still not for the inland waterways. And then if those new technologies don't work out enough you might add new capacity. Traffic has to be safe and fluent, of course. The data exchange is helpful for that. Data exchange leads to further development of the river information services. I'll talk about that later.

But first I'd like to show you a map of the Netherlands. In fact, you've got two main streams on inland waterways. There's inland waterways in the figures there. There are the TEUs per year.

You see the west east line from Rotterdam to Germany. Of course, it's very important. But even the inland waterway to the north of the country is very effective if you look at it. And that means, of course, there are lot of container transport more than 100,000 TEUs per year, and that's a development.

Mr. Roos also mentioned ten years ago when we decided to build a railroad from the Rotterdam port, we didn't expect that inland transfer to go on waterways, especially not on short distance. But we were quite surprised to find out that through competition, between different modes of transport you find a lot of container transfer on short distance. And even with barges of only 32 TEUs, which is very good for short transfer.

They're even thinking about some regular services, some floating stock firms like Heineken from the beer and Proctor and Gamble from the pampers. They are going to start a pilot on that next year, and we expect quite a lot of that. And that's really an innovation, I think.

So, you might have ideas about the future, but you might be surprised to find out that it's different than you expect. Well, I skipped the containers. River Information Services. The development of the Regional Transfer Center, you can see quite a lot. This has to do with intermodal transport, of course.

And again it's remarkable to mention that the same Heineken transferred all the export beer through inland waterways to the harbor instead of by truck before, and that makes a big difference for us that's responsible for the roads like I am, also.

Then we go to River Information Services. What's that? Well, we have to develop it, so I can't tell you exactly. But you find out that when you look at the whole transport chain, there are lots of people involved from producers to customer, of course, but even police for the safety, fire brigade for calamities, info providers, but also shippers and skippers and shipowners. And they all have their own data in the system, but they don't fit. They're a misfit, or they're off, and that's a waste of money and effort. But it's also a possibility for mistakes and loss of money, of course.

So, you can have information service in the field of forest planning, transport management, traffic management, calamity, abatement, lock and bridge planning, port and terminal planning, and supervision like your police and fire brigade as I mentioned.

If you manage to get into Phase II of this field, and you make agreements of compatibility of this, you might win a lot. That's our intention. And it's decided in the European Commission that we shall pay attention to that. And we have already started some projects like information data, river information system, and that's working quite well.

On the next sheet you can see what you can get when you don't make the links between the different data systems. Because waterways get crowded, you must know where ships are and when they are there, and what they've got for cargo.

So, there are lots of initiatives to improve those data systems. And we expect a lot of this in the future. There are quite a few international organizations busy in the field, European Commission Fifth framework program has got funds available that's where the money comes from Dr. Hochstein. If you put forward good proposals to the European Commission, you get money for good research programs.

The Rhine Commission is also active in the field. And recently it made a standard for a digital river map, which is very good. And they also installed a working group for standardization on the Rhine.

PIANC also is very active in this field. And you might note that recently it was a report of Working Group 24 on those river information services. And I can inform you that there's also a group active on preparing a brochure. That's a very compact report on this aspect, and that will be published before the Sydney Congress.

And I've seen the program of Sydney. Lots of papers are on this information services, and lots of descriptions I'm sure will be in this compatibility of information in Sydney. And I think we will reach very good conclusions there.

And the last thing I mention, in many European countries that are responsible for inland waterways, there's now a platform that's going to coordinate this national initiatives. Because the main problem, of course, you can work on it, but you have to do it in the same direction in the same system in the same language.

Just to conclude, this was about new technologies and innovation. I expect that innovation in the field of date exchange will get high profits. Also, you have to innovate in standardization of regulations and in cooperation with Europe. Because when you want to use European waterways, you must have the same regulations and the same standards for infrastructure. Thank you very much.

Technical Program Conclusions

By MG Robert H. Griffin, Director of Civil Works, U.S. Army Corps of Engineers

Well, unlike the other panelists, I am the one standing as we say down here between you all and lunch, which is not a good position to be in. I think we all would agree that we had some excellent technical panels. We also had a look at our history, which I think was very appropriate.

To summarize the panels, I will use no slides, although my secretary has prepared some information, which I'm sure is available if you want it. But I notice the attendance was very good throughout, and I certainly heard the panels as well. In presenting what I heard from the panels, I will do this like a lawyer would. And that is, a lawyer would stand before a jury, and I think the lawyer would say this, regarding waterborne transportation, demand will increase as trade and population grow. The ability of road and rail to expand is minimal. Therefore, we will have increased congestion.

I think back to my days in Deutschland. And I think about Mercedes going 200 kilometers an hour, this close to trucks going 50 kilometers an hour, and it's very scary. I cannot imagine more trucks on those autobahns.

I think the lawyer would also say this, container shipping will increase and will require a more integrated intermodal system.

I think he would also say that environmental challenges must be addressed. Someone said that you can run from the environmentalists, but you cannot hide. You will have to deal with them.

And I think a lack of maintenance occurs, with the reality of scarce resources in both countries. Our lack of maintenance is a quiet tragedy. There are no catastrophic events like on a highway. You don't get a burning river. You don't get a bridge that falls in that kills people in two or three cars. It is a quiet tragedy and therefore goes unrecognized.

I think you could also say waterborne transportation is safe, and we didn't address this much. But it is safe, it is efficient, and it is environmentally friendly. I think we heard Karin De Schepper say, remarking on a new canal, you could not tell that the river was actually a canal. And I think that is a very telling statement.

I will conclude as a lawyer and I'd say, these are the facts and they are irrefutable. That's what I would say.

Engineers and scientists tend to believe that all this is obvious. It is clear what we must do and that everyone understands. But Les Sutton pointed out if it does not bleed, it does not read. We here in America say, you don't get the Kodak moment from a lot that we do because, again, we are successful. That is part of the problem. We are quietly successful.

And he also said that we have turned our backs on the rivers and turned more to the highways, and that's what the public sees. They can literally be going down a road, completely unaware of navigation. I have done this myself. I know that the Ohio River is one mile away, and I know because I'm in the business that over 200 million tons of traffic moves on that river. But in the summertime with the leaves out, you never see it. It literally is out of sight, out of mind. And we heard that as well.

We did hear one promising counterpoint from our European colleague, and that is if we do well, politics will follow. I think it is an evolutionary process, but it was heartening to hear that.

So where do we go from here? I will give you two thoughts. One is there's much talk today, at least in America, about learning organizations. We use this term a lot. A learning organization is one that shares experiences. We identify and record lessons learned. But here is the key, it is not enough merely to share those ideas. We must change our behavior or processes based on these lessons learned.

If we do those things, then we truly are a learning organization. And I think PIANC is definitely a learning organization. What you do here in these forums I think is very important. It is vital. And I know you are internationally recognized as a learning organization, and you must continue to do that.

Now, the second lesson is, I believe we must do a better job of educating the public. We must understand our audience, develop a common simple message and repeat it again and again and again. I can't speak for Europe, but I can tell you in my short time in Washington, D.C. I now know it is not the complexity or brilliance of a message. It is a simple understandable message that is repeated over and over. Simplicity and persistence are the key in Washington, D.C. That I have learned.

Well, I also know some believe that our good works will speak for themselves. I too used to believe that. I no longer believe it. I believe you tell your story before

someone tells it for you. I also believe PIANC is on the right track here. They're moving in the right direction. I would encourage the organization to continue.

And you heard from some of the later panelists how we're starting to integrate our messages, our data. So, they're not snapshots, but more integrated and more importantly, understandable to the public. It must be simple and understandable and told again and again.

On a personal note, Ian Gillespie and I were in an outdoor conference on Tuesday. And I think he sums it up best, and I will paraphrase it again, if I may. He said it is not enough to be engineers or scientists. We must also be managers, leaders, and communicators. And I think that was very well said, and an appropriate conclusion to my remarks. With that, I thank you for your attention.

